VOL. XXIX. NEW YORK—THURSDAY, JULY 3, 1913—CHICAGO NO. 1

The AUTOMOBILE

May Production Breaks All Records

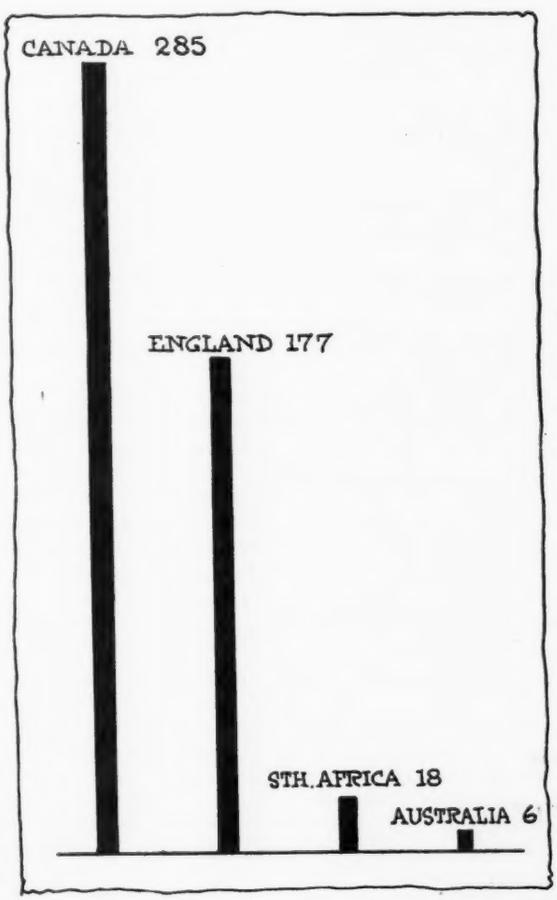
Detroit Alone Shipped Over 36,000 Cars During that Month—Annual Figures Given Out By Makers Show Vast Increases Over Last Year

By J Edward Schipper

DURING the month of May more than 9,000 car loads of automobiles left Detroit alone. The average freight car carries four automobiles. At this rate more than 36,000 automobiles were shipped alone from Detroit. April and May are the 2 heaviest months of the year for automobile shipments, but even during the winter that the production is enormous may be judged from the fact that 5,000 carloads of automobiles left the city of Detroit alone during January. In February 5,800 carloads were carried away, which makes more than 43,000 automobiles during these 2 months. During the month of May the production of automobiles in the city of Detroit was only 17.7 per cent. below the combined production during the months of January and February.

Earlier in the year THE AUTOMOBILE estimated that Detroit would turn out about 385,000 cars for 1913. That this figure will not be far off is shown by the fact that the Ford company alone turned out 22,000 cars in May and 22,040 cars in April and the company is now working on a 1,000-cars-a-day schedule. If this output is kept up every month and the outputs of the other factories remain the same as they are now the production during the year of 1913 will be 400,000 cars.

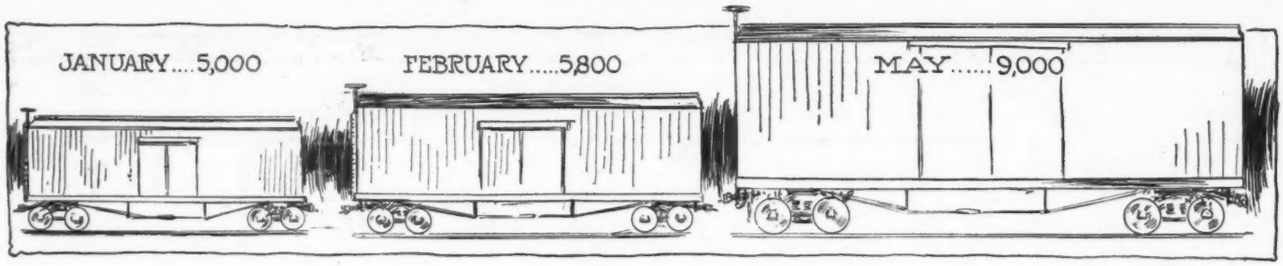
During the month of May the factories of Detroit built and shipped 36,713 passenger automobiles. The month of May will probably be the biggest month of the year, although many of the makers had their greatest period of production in April. When one considers the enormous output for 30 days and the vast number of cars which are already in the market he cannot help but be struck with wonder as to where all the cars go. Yet the makers are having a hard time to keep up with the demands of their agents, many of whom cannot give their customers deliveries on certain models for some 30 days or more. The May production of Detroit cars is greater than the total output of the city during the entire year of 1908 and it falls only a few thousand short of the estimated production of 45,000 cars for 1909.



About 500 passenger cars are despatched to foreign countries from Detroit every month. The figures covering the exports to the various English-speaking countries during the month of April are shown proportionately in the above diagram

A noticeable feature in connection with this vast output and shipment of cars is the efficiency of the traffic department of the Automobile Chamber of Commerce in securing the return of empties to Detroit to meet the demands of the makers for proper shipping facilities. At present there is no noticeable shortage of freight cars in Detroit, although for the past 2 years the scramble for suitable cars seriously held up deliveries and struck a heavy blow at the industry.

Of this vast number of cars nearly the entire amount are being absorbed in the United States, only 493 cars being shipped to for-



Comparison of freight shipments of automobiles from Detroit during January, February and May, 1913

eign countries from the United States during the month of April.

While the May exports through Detroit will be much heavier than this, they will not amount to an appreciable percentage of the 36,700 cars.

These figures from Detroit alone show the staggering production for the 1913 season. Besides these figures the enormous production of other large centers, such as Indianapolis and Cleveland, must be considered. The cars made in Detroit are probably 70 per cent. of the cars made in America, and every manufacturer in the business predicts a greater output for 1914 than for the present year.

In estimating 450,000 cars for 1913 THE AUTOMOBILE deducted 25 per cent. from the estimates of the makers, which added up to over 600,000 cars for the 1913 season. The total number of cars built for 1912 was 378,261. Of this number, 340,746 were passenger cars.

Output Outgrows Facilities

The increase in floor space of the factories has been enormous, but still it has not been in proportion to the vast increase in output. The amount of floor space per car turned out grows less each year and this is due to an increase in efficiency in manufacturing methods which is as marvelous as the increase in output itself. There are five points upon which American methods have brought a remarkable change in the output of a factory. These points are organization, special machinery, welfare work, factory design and education of the workmen along the lines of personal efficiency.

The system of government of a large factory is as well designed and as well organized as that of a country. The administration building of a plant is as important to the manufacturing organization as the heart to the human body. From this point radiate all the activities and the life blood of the organization. It is here that the systems originate which allow those in charge to know exactly what it costs to make every part of the car, whether it is the smallest set screw or the most complex cylinder casting. The following up of the work through the plant is done from this department. The planning of the work, if done in a lucid and clear manner, is half the battle won for the workman in the shop who picks up the drawing and is able to follow its most minute instructions without making trips to various points of the floor to ask questions. It is in the administration building that the forms, which when filled out furnish a complete record of each piece of work, are designed.

The workmen themselves often assist in the designing of systems, which not only save time but render the individual of greater value to the concern by permitting him in the same length of time to turn out more work with often less effort to himself. In many of the factories meetings are held to discuss shop methods, and these are of utmost value not only to the workmen but to the employer. Through the lines of control radiating from the central administration building, the executives have their fingers upon the pulse of every department and sub-department of the organization, and are therefore able to concentrate their efforts on the particular point at which they feel that educational work, etc., would be of value. Special machines which do the work that was formerly done by three smaller machines are common in every factory building its own parts. One man does the work of three with a machine of this kind. He does it better and he has less space to do it in and still does it in the same time. The cost is therefore cut to a third on such a machine, and the amount of work for a square foot of floor space is increased. This means dollars and cents saved in the taxes on property and in the amount of money invested in the factory site.

Welfare work is not universally recognized among factory managers. There are many who still believe that it does not pay. The number of these, however, is decreasing and the number of those who believe that a man with clean hands who has eaten good food and has plenty of light is a better workman, is rapidly increasing. Many of the biggest factories have a fully equipped restaurant, an athletic field, individual washbasins, lockers, etc., for their workmen. Those who have tried the experiment are convinced that it means money in the treasury of the factory.

Factory and welfare work go hand in hand. Proper ventilation, the correct position of the light, the carrying off of poisonous gases, the convenience of exits, the shape and position of staircases, the number and capacity of elevators, the space possible between revolving machinery, the heating apparatus, etc., all have their definite influence on the quantity and quality of the work turned out.

Personal efficiency is a matter of applied psychology which has not been accepted in as many places as it eventually will be. Still the work carried on in this line has resulted in wonderful changes in the time required to do manual work. The objection to introducing methods of instruction in personal efficiency of the workman has been that it is apt to stir up ill feeling among them and be misunderstood. It has, however, been a factor in the enormous production of the past year and will no doubt be carried further in future seasons.

Production figures for the year cannot be definitely obtained because many of the manufacturers are now continuing one model directly after the other without listing them as annual models. Comparison of the outputs of the months show more completely the combined output of the various companies. The months of greatest production of the different companies vary considerably, but if the figures were taken for April and May the greatest output for most of the concerns would be included. Out of thirteen representative companies seven had their greatest output in May, four in April, and one in February. This particular concern turned out 1,913 cars in February and 1,800 during the month of May.

Views on Annual Models

Regarding the production of annual models these can no longer be taken under exact consideration because many of the companies do not believe in the annual model, but rather in introducing changes during the year as they are approved and by naming their cars in series. Thus there might only be 1,000 cars of one series made and 20,000 of the next series, and it would be impossible to state that this company made so many 1912 or 1913 cars. In response to inquiries sent out by THE AUTOMOBILE some interesting letters were received on this matter of which a few are published herewith.

H. H. Franklin Manufacturing Company—We do not believe that the annual model is necessary.

In our opinion the best time of the year to announce a new model, or a yearly model, is in December. It seems foolish to spring new models in the height of the selling season.

We do not think there is any great difference in the minds of the public whether new models are called new types or new series.

The announcement of a new model between April 15 and June 30 has an injurious effect on the selling period. Whenever buyers think new models are going to be announced they very naturally desire to wait until the new models appear.

H. H. FRANKLIN, president.

Cole Motor Car Company—I believe that the annual model is necessary at present, owing to the improvements that naturally come along each year, but that no announcements should be made before July first.

I do not believe there is any difference in the minds of the general public as to whether these models are called new models or yearly models, or serial numbers at the present time, but am inclined to believe if all of the automobile companies would establish a serial number and make plain in their advertisement that when they improve their product, they establish a new series, in time it would place a different feeling amongst the buying public.

The manufacturer could then bring in an improvement any season of the year if it could be attached without the redesigning of any special part of the car. I do think the announcement of new models between April 15th and June 30 has an injurious effect on the selling period. J. J. COLE, president.

American Locomotive Company—The question of the annual model is an old one. I can see advantages in both methods of handling. A good many people think the proper way to handle it is to make improvements as they go along, but in my retail experience I am satisfied that business is stimulated in the fall by bringing out a new model, particularly when you can say to the prospective purchaser that the car he is purchasing this fall is the same as will be sold him in February or March. He, therefore, makes a purchase where possibly he might not be inclined to do so, thinking that, perhaps, it would be better to wait until the last minute so as to get whatever improvements might be added.

Announcements Too Early

I think, however, that the makers who bring out early models make mistakes in announcing them as early as they do. Unquestionably, the general falling off of trade in the latter part of April, May, or June, is due to the fact that a maker, trying to be first in the field, comes out with a premature announcement, scaring the prospective customer and making him hold off until the new model has arrived.

C. A. BENJAMIN, general sales manager.

Ford Motor Company—1. We do not believe in annual models and have never announced even a change in the type of body or the new price at which our Model T would be sold prior to October of each year. All of our contracts with dealers run from October 1 to September 30, this being our fiscal year.

2. We do not consider that there is any difference in the minds of the public regarding whether the new models are named by series or otherwise.

3. Makers who announce new models between April 15 and June 30 must seriously affect the selling of all of their dealers as few, if any, dealers have marketed the cars purchased between April 15 and June 30 and, consequently, the announcement of new models at that time would stop the sales, except at cut prices, of the cars they were carrying in stock. One of the things that has made for Ford success has been the same model for six consecutive years, with such refinements as we saw fit to introduce at any time during the year when we deemed it advisable. N. A. HAWKINS, sales manager.

Annual Model Undesirable

Haynes Automobile Company—The question of the annual models is one of the most vexatious with which we have to deal. For certain reasons I personally have been more or less forced into continuing this annual model idea up to the present moment, but it is my earnest desire to get away from it entirely. I think the product of a going automobile manufacturer should be marketed irrespective of any certain part of the year in which a car might be made, and I believe that it is possible to eliminate the yearly model entirely, although just how and just when this condition can be brought about is a problem. It seems to me that the subject is one of such importance, both to the manufacturer and his dealers, that it could well receive serious consideration on the part of the Association of the Manufacturers and that some firm and advantageous policy can be, and should be worked out to cover same. I see no reason why it would not be as well, in fact, better for all departments of the industry, if mechanical changes or changes in design of body, etc., were made in any calendar month instead of having them made to become effective on July 1 or August 1 when the fiscal year of most factories ends. It has been my policy to keep secret so far as is possible all information concerning new models or radical changes.

In answer to the three specific questions that you have asked, I would state as follows:

1st. I do not believe that the annual model is a necessity, and I believe that the habit of making annual announcements on or around July 1st is unnecessary and detrimental to the industry.

2nd. I do not consider that in the minds of the public it makes the slightest difference whether new models, new series or any other form is used meaning the same thing, they are all equally bad.

3rd. In my mind it is probable that making announcements as early as April 15 concerning new models to be brought out later has had a detrimental effect on the business of the manufacturer and the dealer during the latter part of the spring and the summer months. GEORGE H. STROUT, general sales manager.

The F. B. Stearns Company—This year I am trying to get our boys to say nothing about the new models, or to make no announcements, but quietly commence delivering them and see what the effect will be. Undoubtedly the expense to manufacturers as a whole in bringing out new models is several million dollars a year.

If these changes could be brought about gradually without calling any special attention to them the public would still get the improvements, but a large part of the cost would be saved to the manufacturers by making the changes and the improvements at the most advantageous time in relation to the manufacturers' own business, and it is quite evident that conditions would frame themselves up so that each year it would be not only unadvisable, but extremely costly, to make these changes on the same calendar date. F. B. STEARNS, president.

The five factors considered essential to success in a big production by most of the leading manufacturers

Long-Stroke Movement Grows in Europe

Manufacturers Will Show Their New Models Earlier Than Usual Owing to Late Date Set for Paris Show

PARIS, June 26—New European models will be shown at an earlier date than usual, owing to the decision of the French automobile manufacturers to hold their show in the Grand Palais from October 17 to 27. This will be the first European show of the season. The same general lines of development will be observed as a year ago, there being nothing startlingly distinctive, but no small amount of detail improvements. The long stroke movement is on the increase. The maximum piston stroke will not be any greater than it was a year ago, but the average will be considerably higher. Two years ago a motor of 80 by 180 millimeters (3.1 by 7.08 inches) was looked upon as a racing type. For the present season the number of such motors is comparatively small. For 1914 there will be a considerable number of motors of 170, 175 and 180 millimeter stroke. The more conservative firms which held back a year ago on the question of piston stroke are coming into line and are nearly all increasing their strokes by 10 millimeters. The average French ratio of stroke to bore will certainly be very close to 2 to 1 for the 1914 season. This year's racing experience will further strengthen the long-stroke movement. With absolute liberty except in the amount of fuel to be consumed every manufacturer has built a long-stroke motor. If engineers prefer the long-stroke motor when not pushed to it under a limited bore rule, it is certain that it will become the leader for touring cars. It should be noted that it is no longer a case of dodging taxation; under the new French law adopted a few months ago, stroke is taxed.

No Increase in Motor Sizes

There is no increase in size of motors, the average bore for four-cylinder models not going beyond 85 millimeters (3.3 inches). There will be little if any increase in the number of six-cylinder motors. There is a possibility of eight-cylinder developments. A year ago De Dion produced two types of eight-cylinder V motors and has met with considerable success. Several French firms, at present producing nothing but fours, have now under consideration the advisability of building small eight-cylinder models, this being an easier task than the designing of a six-cylinder motor. Some of these eight-cylinder models under consideration will have a bore as low as 2.7 inches. It is evident that there are very few difficulties in the building of an eight-cylinder motor; it is superior to the six in evenness of torque and it does not make the bonnet any longer than for a small four-cylinder power plant.

The typical motor is an L-type in a single casting for very large sizes, and with integral intake manifold, the carbureter being bolted close up to the cylinders. Integral exhaust manifolds are commonly met with, for the general desire is to get as clean-cut an appearance as possible, but these are not universal. Two-bearing crankshafts are going out of use except for very small motors, of 70 millimeter bore or less. Several makers who had two bearings for motors of 75 millimeter bore are now using a central bearing. There will be at least two new motors in the show with detachable heads. It must not be inferred, however, that this type of motor is about to meet with popularity, for in the cases under review the head has been made detachable for reasons of economy. There being a decided increase in the power obtained from motors, lubrication has received a considerable amount of attention. Forced lubrication through a hollow crankshaft will be in the majority next season, followed by the circulating type with troughs under each connecting rod. There has been a very considerable increase in the size of oil pumps. One of the leading makers of a 75 by 130 millimeter four-cylinder motor will next season have 2.5 gallons of oil in circulation. Fins are very commonly fitted to the base of the crankchamber to assist in cooling the oil. One new motor, a high-efficiency type of 90 by 180 millimeters, will have a water-jacket round the oil sump. Provision is being made for very readily varying the oil pressure. This is not an adjustment to be made while the car is in motion, but a change that can easily be made when the car is about to undertake fast work or leave a level for a mountainous district. The chain drive for camshaft and for magneto and pump shafts is becoming more and more common. Its representatives will be in a decided majority over those of the practice of meshing pinions.

So far as French makers are concerned the cone clutch has a preference over all other types. The disfavor in which the multiple disk-clutch has been held for some time has continued. The central location of gearset, with a double universal joint between motor and gears in common, the two units being carried, in nearly all cases, on a sub-frame. The unit construction will have a few more followers, particularly for small motors; there will be practically no examples of gearboxes on the rear axle. Four-speed gearsets will be found to be more common. Instead of the selector or gate being on the frame member, it now forms a part of the upper casting of the gear box, thus being free from any twisting and binding. By having various lengths of sleeve, the lever can be brought to any desired position and there is no necessity for it to be outside the body. In this connection it should be mentioned that left-hand steering and center control are not at all in favor with European manufacturers except for commercial vehicles and taxicabs.

Worm-driven rear axles are far from having won a predominating position on French cars. Three new firms are known to have worm-driven rear axles ready for next season, but it is quite possible that some of those who adopted it last year will go back to bevel gearing. On the whole French makers are far from convinced that the worm is superior to the bevel.

The forward half of the rear springs is being more and more used for taking the driving effort. Last year this was in a majority over any other single system, but there is a possibility that it will equal all other systems combined at the next show. With the drive taken through the springs two universal joints are naturally employed. Several makers are providing for these joints to be on ball bearings. This was done on last year's Peugeot racing cars, it is adopted on the racers for the present season, and notification has been received of several firms who are making it a standard feature.

Attention is being paid to the reduction of unsuspended weight, and efforts are being made to secure a clean-cut, symmetrical rear axle. Two cases could be mentioned, in one of which there is an aluminum axle formed of two equal parts, each half comprising the tube and one-half of the differential housing, and in the other a similar type of casing with internal steel-tube sleeves. In these two cases there is a slight obliquity of the drive shaft. Three-quarter elliptic springs have gone out of favor and have been replaced by long semi-elliptic ones. The objection to three-quarter elliptics is the amount of side sway set up, particularly with closed bodies and at high speed. Springs are broader and thinner than ever before. As an example, one medium four-passenger car, with a motor of 80 by 150 millimeters, will next year have rear springs of 2.5 inches width. On this car the top leaf is reversed to give a little more stiffness against recoil and also to add more strength for transmitting the driving effort. Several cars will be shown with the rear springs in the same vertical plane as the frame member, instead of standing outboard as on the majority of cars at present. Underslung rear springs will be more common.

Brakes Are of Larger Diameter

Brakes have been made of bigger diameter all around, they are invariably of the internal-expanding type and have ribbed shoes to assist in cooling. The practice of putting both sets of brakes on the rear wheels is increasing, the brakes being side by side in practically every case. Easy brake adjustment has been given close attention. One of the neatest new arrangements to be seen at the coming show will be a thumb screw adjustment for the rear brakes on the frame member. The connection from the brake levers to the operating lever is by means of steel cables, the two ends of which are passed into and secured in a small metal block. Passing into this block is a long screw with a left and right-hand thread. By turning this screw the blocks can be brought closer together, thus shortening the length of cable and bringing the brake shoes closer to their drums. The winged nut outside the frame member and forming the head of a screw-

driver, turns the screw. This arrangement practically forms an endless cable with an adjustment on it. By passing this cable round a pulley on the end of the operating lever a simple equalizer is formed.

The demand for self-starters does not appear to have struck the European manufacturer as important. This lack of a mechanical starter may probably be set down to the absence of extremely cold weather, the strong desire for a very clean-cut motor, and the employment of a paid chauffeur on all cars of medium or large size. At present self-starters appear to be looked upon as too costly, too complicated and too cumbersome. There are other qualities which the European motorist looks upon as far more important than mechanical starting. There is no doubt, however, that if a really simple and efficient self-starter were supplied it would meet with favor. One of the leading magneto firms in Europe is reported to have important improvements in car starting and lighting which, if found to be as satisfactory as is claimed, will doubtless cause something of a sensation. Regarding electric lighting, manufacturers are giving way sufficiently to make special provision for fitting a dynamo, but it is doubtful if there will be any French firm selling a car complete with an electric lighting installation.

Bonnets must harmonize with the car bodies. This is so thoroughly understood that there will be probably no car at the Paris show with an abrupt break at the dashboard. Where they do not make complete cars, manufacturers are willing to sacrifice their bonnets to make this covering harmonize with the body-lines. Gas tanks will either be on the front of the dashboard or under the scuttle dash. Next year's car lines will not only be of the straight through type, but all angles will be rounded off. This will be most distinctive with regard to radiators. Instead of the radiator frame having sharp angles, these will be gently rounded off, thus removing a certain harshness which exists with the usual sharp break. The rounded-off radiator also harmonizes better with D-fronted closed cars and the rounded off stern. There will be considerably more examples of side lamps let in flush with the scuttle dash, thus avoiding the use of lamp brackets and projecting lamps. Headlights are a more difficult problem, the only change that has been found in this direction being the fitting of a single lamp in the body of the radiator, as found on a certain American car.

European body designs of course vary with the country of their origin. In France, saloon cars will be popular, these having a single entrance at each side, as D-fronted roof and all the angles rounded off. It will be more common to make provision for spare shoes by a locker under the rear seat, admission to this locker being secured, as far as possible, without breaking the lines of the rear panel. Fancy wood linings are in favor for saloon cars, and the latest fad is to have oval section panels in which engravings or oil paintings are fitted. This gives possibilities for distinctive and artistic treatment. Detachable wire wheels are increasing in popularity.

Pathfinders Complete Transcontinental Survey

DETROIT, MICH., June 26.—Henry B. Joy, president, and Frank H. Trego, research engineer, of the Packard Motor Car Co., have completed their survey of the route between Detroit and San Francisco, undertaken on behalf of the newly formed Lincoln Highway Association, with the idea of learning the possibilities of a transcontinental route from ocean to ocean.

Mr. Joy drove the entire distance and his companion took notes as to road conditions. They reached the coast in 15.5 days after a leisurely journey that was uneventful so far as trouble was concerned, but which was intensely interesting from a good roads viewpoint. Reaching the coast the Packard men returned by train.

"The days of roughing it on a transcontinental trip are past," declared Trego upon his return. "It no longer is a hardship to drive to the Pacific Coast, and in 1915, when the Panama Exposition is held, it will be far easier. Good roads are springing up throughout the West, old highways are being improved and cutoffs discovered which greatly shorten the distance. We covered 2,753 miles on our trip, and that was only 100 miles longer than it is by railroad.

"We made the entire trip without sleeping once in a hotel, and only once did we eat at a hotel. Our camping wagon was fitted up with all conveniences and we slept out each night. This made it comparatively inexpensive and our expenditure for the entire outgoing trip for three of us amounted to only $200, and that covered everything but tires. We had two blowouts and two punctures.

"No trouble was experienced with our carbureter because of the high altitudes, and we did not have to change its adjustment. The oldtime arroyos have disappeared and it was comparatively easy going. In the rainy season, though, it would not have been so easy. When it rains out there, all there is to do is to wait for it to dry up.

"It is comparatively easy to get gasoline along the way—even the ranches have gasoline for sale—and prices are fairly cheap. The highest we paid was 60 cents a gallon, and that was where the fuel had to be carried 150 miles by wagon.

"Nevada has the best system of signboarding we found in any one state. Even with its small population, the work has been carefully done and one cannot get lost if one keeps his eyes open—the friendly posts bob up just when you are in doubt. Better still, these same posts run through the various towns, so that one does not waste time inquiring the way which we have to do in some parts of the country.

"The West is growing up rapidly and there are garages everywhere, even in the smallest towns. And these garages would be a credit to a big city. They are modern in every respect, well stocked and the mechanics apparently know their business."

The route followed by the Packard officials led through Valparaiso, Ind.; Geneva, Ill.; De Kalb, Dixon, Sterling, Morrison, Clinton, Ia., Cedar Rapids, State Center, Grand Junction, Council Bluffs, Omaha, Neb.; Kearney, North Platte, Big Spring, Kimball, Cheyenne, Wyo.; Laramie, Medicine Bow, Rawlins, Granger, Ogden, Utah.; Brigham City, Kelton Camp, Lucin, Tacoma, Montello, Cobre, Fenelon, Wells, Nev.; Duth, Elko, Elko Camp, Elko Hot Baths, Ruby Range Camp, Eureka, Austin, Alpine Ranch Camp., Alpine Camp, Dry Lake, Falen, Hazen, Wadsworth, Reno, Truckee, Cal.; Donner Lake Camp, Colfax, Auburn, Folsom, Sacramento, Stockton, Dublin, Dublin Camp, Oakland.

Pennsylvania Raises License Fees

HARRISBURG, PA., June 30—Pennsylvania automobilists are generally interested in the automobile regulation bill, which was passed this week by the state senate. The bill increases the rates for automobile licenses in every instance, except for passenger cars of less than 25 horsepower. This means an increase of $200,000 annual revenue for road improvement.

Under its provisions municipalities and all local bodies are denied the right to fix a speed limit for cars or tax them.

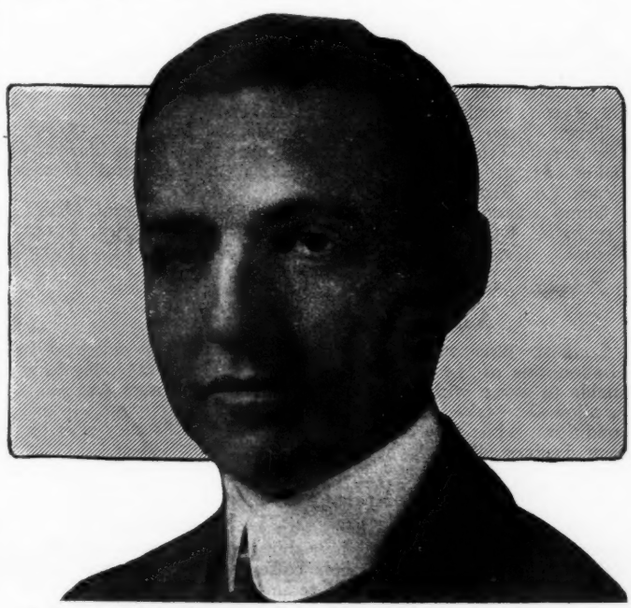
Passenger cars over 35-horsepower are increased $5 and dealers' cars from $5 to $10.

A concession has been made to the dealers in motor trucks, who protested against the prohibition of trucks weighing with load more than 20,000 pounds and they are permitted by the amended bill to reach a total weight of 22,500.

The bill corrects the clauses regulating joy-driving, driving a machine without the owner's permission, or while intoxicated, and provides jail sentences for all violations. Automobile licenses are half price after July 1. The speed of passenger cars is left the same as at present, but that of heavy trucks is reduced.

Philadelphia Tire Man Missing

PHILADELPHIA, PA., June 24—The Philadelphia Automobile Trade Assoc. has started a country-wide search for J. W. Lyman, manager of the Philadelphia branch of the Republic Rubber Co., who has been missing since April 28, 1913. Mr. Lyman is 35 years old; his height is 5 feet 8 inches; weight 135 pounds, fair complexion, light hair, smooth face, light blue eyes, small scar over right eye, large white teeth. His car was a 1913 Model N Regal roadster.



J. W. Lyman, missing manager of the Philadelphia Republic Rubber Co.

May Exports $3,692,700

3,036 Cars, Including 141 Commercial Vehicles, Exported—Parts Valued at $4,690,983 for 11 Months

Imports of Automobiles Dropped from Seventy-Six, in May, 1912, to Forty-Two in May Last

WASHINGTON, D. C., July 1—*Special Telegram*—Three thousand and thirty-six motor cars valued at $3,155,189 and $537,511 worth of parts were exported during May, according to Government statistics made public today. Of this number 141 were commercial cars valued at $236,383 and 2,895 were passenger cars valued at $2,918,806. The exports in May a year ago were 3,009 cars valued at $2,936,818, while the parts exported were valued at $448,972, the exports for the 11 months ending May increased from 19,816 cars, valued at $19,433,965 in 1912, to 23,132 cars, valued at $23,821,782 in 1913.

Exports of parts increased from $3,745,320 to $4,690,983. Imports of cars dropped from seventy-six, valued at $165,759 in May, 1912, to forty-two, valued at $113,737, in May last, while during the 11 months they declined from 921, valued at $2,033,254 in 1912, to 704, valued at $1,653,864 in 1913.

Contracts Let for Forty Postal Trucks

WASHINGTON, D. C., June 30—*Special Telegram*—Contracts for forty motor trucks for use in the parcel post service were let by Postmaster-General Burleson today. Twenty of the machines of the four-wheel type with a capacity of 1,500 pounds will be furnished by the White Co., at a cost of $2,060 each. The other twenty, of the three-wheel type, are to be furnished by the Wagenhals Motor Co., of Detroit, at a cost of $625 each. The three-wheel machines are to be of 800 pounds capacity and are to have non-skid tires on front wheels and Motz cushion tires in the rear, the White cars to be furnished with pneumatic tires. The forty cars will be distributed to the larger cities.

Bids Opened for Electric Trucks

WASHINGTON, D. C., June 29—Bids were opened this week by the director of the bureau of engraving and printing for furnishing five electric trucks. The bids were as follows:

Utility truck—Argo Electric Vehicle Co., Saginaw, Mich., $2,025; Commercial Truck Co. of America, Philadelphia, $2,585; Kentucky Wagon Mfg. Co., Louisville, Ky., $1,900; Cook & Stoddard Co., Washington, Baker, $2,425; General Motors Truck Co., Philadelphia, $2,535; General Vehicle Co., $2,125.

Truck—Kentucky Wagon Mfg. Co., $2,825; Argo Electric Vehicle Co., $2,890; Cook & Stoddard Co., Baker, $3,125; General Motors Truck Co., $2,885; General Vehicle Co., $2,810.

Five-passenger electric road wagon—General Motors Truck Co., $3,060; Cook & Stoddard Co., Baker, $3,000.

Truck, 7,000 pounds—Kentucky Wagon Mfg. Co., $3,788; Commercial Truck Co. of America, $5,080; Cook & Stoddard Co., Baker, $3,950; General Vehicle Co., $4,015; General Motors Truck Co., $4,763.

Dump wagon—General Vehicle Co., $3,140; General Motors Truck Co., $3,604; Commercial Truck Co. of America, $4,140; Kentucky Wagon Mfg. Co., $3,156; Cook & Stoddard Co., Baker, $3,475.

Another London Taxicab Strike

LONDON, June 26—Another taxicab strike has occurred in London, one of the companies, employing about 125 cabs, being unable to agree with the men's demands. The men wanted to be allowed to take their cabs out to race meetings on their own conditions, while they also demanded that two drivers who had been discharged should be reinstated.

Shell Company Has Big Year

LONDON, June 26—The Shell Transport and Trading Co. appears to have had a most flourishing year during the petrol crisis, and have well filled their coffers. The chairman stated that there were certain features remarkable. The reserve funds were increased from $5,700,000, at which they stood last year, to the magnificent figure of $15,000,000. On December 31, 1912, the company held $11,101,300 in actual cash and liquid resources invested outside the business. The prices for kerosene obtained in the year under review were at a normal level, and compared favorably with the abnormally low prices of 1911. The prices for paraffin were low, but were compensated for by the increase of their production; while the net prices obtained for their petrol were more favorable. They had erected installations for the storage and sale of petrol in San Francisco, Seattle and Montreal, making it, they hoped, impossible that prices could be kept high on the American continent and be depressed to an artificially low level in Europe.

Working on Knox Reorganization

BOSTON, MASS., June 28—A stockholders' committee headed by Boston interests is working out a reorganization of the Knox Automobile Co., whose plant at Springfield is one of the few motor companies in Massachusetts. Stock of the company—$500,000 common and $500,000 preferred—is owned mostly in New England. A large percentage of the shares has been deposited now with the Old Colony Trust Co. of Boston, upon request of the commitee. One of the biggest stockholders is the estate of the late Alfred N. Mayo of Springfield, who had been a chief factor in the affairs of the company for 5 years prior to his death a year ago. During this period and especially during the last year he loaned the company sums aggregating $800,000 out of its total bills payable of a little more than $1,000,000. The company assigned last September to Mr. Mayo's two sons-in-law, Edward O. Sutton and Harry G. Fisk, of the Fisk Rubber Company, who with Charles R. Lewis have more recently been made receivers.

Over a protest of the stockholders' committee a referee in the United States Court has recently appointed Charles G. Gardner of Springfield as the company's sole trustee in bankruptcy. Bankruptcy schedules have, however, been filed showing an excess of assets over liabilities approximating $400,000, or a considerable equity for the stockholders, and the latter propose to make a strenuous campaign for the appointment of three trustees.

INDIANAPOLIS, IND., June 30—S. A. Austin has resigned his position as general manager of the Mais Motor Truck Co., but declines to state his future plans at this date.

Automobile Securities Quotations

The principal development of the week was the continued recovery of tire stocks, among which Firestone and Goodyear led, with advances of 35 and 60 points respectively. Other stocks took part in the general trend and slight advances were noted, and a fair amount of trading was done.

	1912 Bid	1912 Asked	1913 Bid	1913 Asked
Ajax-Grieb Rubber Co., com	110	..	155	165
Ajax-Grieb Rubber Co., pfd	93	100	94	99
Aluminum Castings, pfd	100	..	97	100
American Locomotive Co., com	43¼	43½	29	30
American Locomotive Co., pfd	109	110⅝	102	103
Chalmers Motor Company, com	140	155	135	..
Chalmers Motor Company, pfd	..	..	98	102
Consolidated Rubber Tire Co., com	14	16	14	18
Consolidated Rubber Tire Co., pfd	55	59	60	75
Firestone Tire & Rubber Co., com	276	282	270	280
Firestone Tire & Rubber Co., pfd	106	108	104	106
Fisk Rubber Company, Com	..	..	..	..
Fisk Rubber Company, pfd	..	..	..	100
Garford Company, preferred	90	100	85	95
General Motors Company, com	32	33	26	32
General Motors Company, pfd	74	75	72	77
B. F. Goodrich Company, com	79¼	80¼	27	28
B. F. Goodrich Company, pfd	108¼	108¾	90½	92½
Goodyear Tire & Rubber Co., com	265	275	325	332
Goodyear Tire & Rubber Co., pfd	100	102	97	98
Hayes Manufacturing Company	..	104	..	90
International Motor Co., com	23	25	3	6
International Motor Co., pfd	86½	88	18	25
Lozier Motor Company, com	45	55	15	20
Lozier Motor Company, pfd	..	..	..	90
Maxwell Motor Co., com	..	..	3	3½
Maxwell Motor Co., 1st pfd	..	..	7½	9
Maxwell Motor Co., 2nd pfd	..	..	26½	28
Miller Rubber Company	160	165	133	137
Packard Motor Company	104½	106	98½	101
Peerless Motor Company, com	..	..	45	50
Peerless Motor Company, pfd	..	..	96	..
Pope Manufacturing Company, com	30	32	..	11
Pope Manufacturing Company, pfd	73½	75	..	36
Portage Rubber Co., com	..	..	30	40
Portage Rubber Co., pfd	..	..	96	99
Reo Motor Truck Company	9	10	10	11½
Reo Motor Car Company	22½	23½	19	20½
Rubber Goods Mfg. Co., pfd	108	..	100	110
Studebaker Company, com	34½	35½	22½	25
Studebaker Company, pfd	90	92	82	87
Swinehart Tire Company	104	106	85	88
U. S. Rubber Co., com	66	66½	59	59½
U. S. Rubber Co., 1st pfd	110	110½	102¼	103¼
White Company, preferred	107½	109	102	104
Willys-Overland Co., Com	..	..	56	60
Willys-Overland Co., Pfd	..	..	84	90

$249,202,075 in 1909

Official Statistics Show That Automobile Industry Produced Cars and Parts to This Value in That Year

126,593 Cars Were Turned Out—There Were 85,359 Persons Engaged in the Industry

WASHINGTON, D. C., July 2, 1913—Statistics of the manufacture of automobiles, bodies and parts, in the United States for the year 1909 are presented in a bulletin soon to be issued by the Bureau of the Census, Department of Commerce. It was prepared under the direction of W. M. Steuart, chief statistician for manufacturers.

Of the 743 establishments engaged in the manufacture of automobiles, including bodies and parts, in 1909, only 265 manufactured complete automobiles as their product of chief value, but these establishments employed more than two-thirds of the average number of wage earners engaged in the entire industry.

The total value of products in the year 1909 for the two branches of the industry combined was $249,202,075, of which $193,823,108 was the value of products reported by the establishments engaged principally in the manufacture of automobiles, and $55,378,967 that reported by establishments manufacturing principally automobile bodies and parts.

Of the 126,593 automobiles turned out by establishments of the industry in 1909, all but twenty-three were made in establishments reporting complete automobiles as the product of chief value. In addition to the automobiles manufactured by establishments assigned to this industry, 694 automobiles were reported by establishments engaged primarily in the manufacture of other products.

The total number of persons engaged in the industry in 1909 was 85,359, of whom 75,721, or 88.7 per cent. were wage earners; 2,564, or 3 per cent., proprietors and officials, and 7,074, or 8.3 per cent., clerks—a class which also includes other subordinate salaried employees. Of the persons engaged in the industry in 1909, 82,918, or 97.1 per cent., were males and 2,411, or 2.9 per cent., were females. The average number of children under 16 years of age employed as wage earners in the industry in 1909 was 162, of whom 159 were males and 3 were females.

The following table gives the figures in detail:

	Automobiles		
	1909.	1904.	Per cent of increase.
Number of establishments	265	121	119.0
Persons engaged in the industry	58,142	11,246	417.0
Wage earners (average number)	51,294	10,239	401.0
Capital	$134,592,965	$20,555,247	554.8
Wages	33,180,474	6,178,950	437.0
Value of products	193,823,108	26,645,064	627.4

Rands Buys Warren Plant

DETROIT, MICH., July 1—*Special Telegram*—Although the plant and equipment of the Warren Motor Car Co., Detroit, was sold at public auction on June 26 to the Rands Mfg. Co. by the Detroit Trust Co., its receiver, for the sum of $14,600, a private bid higher than this amount was later received from The Peter Smith Heater Co., also of Detroit, and the deal has been held up pending the hearing on the case in the district court here, which will take place on July 2. It is a question whether or not the property can be sold to The Peter Smith Co. after it has been bid in at auction. The Rands Mfg. Co., makers of automobile tops, windshields and other motor car accessories, plans to devote the Warren plant to extensions of the manufacture of its line and in addition will take up the production of steering gears, lamps, brackets, top irons, tire irons and other parts in the event of the courts upholding its purchase. It is understood that the various parts of Warren cars which are not in its line would be sold by the Rands concern to the Auto Parts Co., which was the highest bidder for the equipment alone.

Two New Klaxon Patent Suits

NEW YORK CITY, June 28.—Lovell-McConnell Mfg. Co., Newark, N. J., has filed suits against the Square Motor Horn Co. and the Salvini Electric Horn Mfg. Co. of this city for alleged infringement of the Klaxon patents Nos. 923,048, 923,049 and 023,122. The suit of the Lovell-McConnell company against the Automobile Supply Mfg. Co., Brooklyn, N. Y., makers of the Newtone line of horns, was argued before Judge Chatfield of the U. S. District Court, Eastern District of New York, on May 19-21 and is now awaiting a decision.

Victor Truck Concern Bankrupt

BUFFALO, N. Y., July 1—An involuntary bankruptcy petition has been filed here in United States district court against the Victor Motor Truck Co., makers of motor fire-fighting apparatus, the factory being located at Military and Beaver roads here. The petitioning creditors and amounts of claims are as follows: Frederick J. Bryant, New York City, $1,450, commission alleged to be due for sale of fire engine to city of New Brunswick, N. J.; Beals & Co., Buffalo, $44.84, judgment for goods, wares and merchandise; McCarthy Bros. & Ford, Buffalo, indebtedness for goods and service, $59.72. The petitioners allege that on April 5, last, the Victor Motor Truck Co. made a general assignment of all its assets to Marc W. Comstock for the benefit of creditors. The petitioners ask that the company be adjudged bankrupt.

Auction Off Searchlight Property

CHICAGO, June 28—The property of the Searchlight Gas Co. of Ohio will be sold on August 14 at Warren, O. In this way it will be tried to cover the indebtedness of the company, aggregating $254,113.54.

INDIANAPOLIS, IND., June 30—J. Guy Monihan has resigned his connection with the Premier company to become sales manager of the Cole company. Homer McKee will retain his title of advertising manager and sales director.

F. R. Bump has been made assistant to the president of the American Motors Co.

Crane Talks Contractors' Trucks

NEW YORK CITY, June 28—At a meeting of the Motor Truck Club, held here on June 25, C. A. Crane, secretary of the General Contractors' Association, spoke of the requirements of the contracting business with regard to motor trucks. He stated that 90 per cent. of the so-called contractors were only material-transporting men, whose business, like that of the real contractors, is governed by bids worked out on a basis of competition. Each bid must be worked out individually, and it always involves an element of chance, so that the addition of expensive new equipment is a risky procedure. It was said that if good trucks could be produced much cheaper than at present, the contracting business men would come in for their share, which would be worth while, as the companies affiliated in the association had a total capitalization of $250,000,000 and held contracts to the value of $534,000,000.

Market Changes of the Week

This week's markets saw a decided drop in prices. Copper opened on Wednesday at $.14⅝ and closed at $.14½, a loss of $.00⅛ per pound. Lead, though quiet and easier, was lower by $.02½ per pound, closing at $4.32½. Tin had a gradual decline from $44.75 per hundred pounds on Wednesday to $42.70 on Monday, a loss of $2.05. Raw silk from Japan closed at a loss of $.02½. Tire scrap closed at $.09½, a loss of $.00½. Cottonseed oil experienced a loss of $.51 per barrel. The situation in the leading crude rubber markets of the world underwent no change of consequences last week. Quiet conditions prevailed on both sides of the water. On the eve of the auction, which opened in London on Tuesday, manufacturers everywhere held aloof from the contract markets or purchased sparingly, while there was apparently little doing of a speculative character. Antimony, beams and channels, Bessemer and open-hearth steels, and the different oils remained constant throughout the week.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Week's Change
Antimony, lb	.07½	.07¼	.07½	.07¼	.07½	.....
Beams & Channels, 100 lbs.	1.61	1.61	1.61	1.61	1.61	.....
Bessemer Steel, ton	26.50	26.50	26.50	26.50	26.50	.....
Copper, Elec., lb	.14⅝	.14⅝	.14⅝	.14⅝	.14½	— .00⅛
Copper, Lake, lb	.14¾	.14¾	.14¾	.14¾	.14¾	.....
Cottonseed Oil, lb	9.95	8.05	8.22	8.44	8.44	— .51
Cyanide Potash, lb	.19	.19	.19	.19	.19	.....
Fish Oil, Menhaden, Brown	.33	.33	.33	.33	.33	.....
Gasoline, Auto, 200 gals	.22¼	.22¼	.22¼	.22¼	.22¼	.....
Lard Oil, prime	.95	.95	.95	.95	.95	.....
Lead, 100 lbs	4.35	4.35	4.32½	4.33½	4.32½	— .02½
Linseed Oil	.47	.47	.47	.47	.47	.....
Open-Hearth Steel, ton	26.50	26.50	26.50	26.50	26.50	.....
Petroleum, bbl., Kansas crude	.88	.88	.88	.88	.88	.....
Petroleum, bbl., Pa., crude	2.50	2.50	2.50	2.50	2.50	.....
Rapeseed Oil, refined	.68	.68	.68	.68	.68	.....
Silk, raw Italy	....	4.70	....	....	4.70	.....
Silk, raw Japan	....	3.90	....	....	3.87½	— .02½
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.....
Tin, 100 lb	44.75	43.65	43.00	42.75	42.70	—2.05
Tire, Scrap	.10	.10	.09½	.09½	.09½	— .00½

Group of automobile trade and newspaper men taken at the recent outing given by the J. S. Bretz Co., New York City

Eighteen Cars Start in Indiana-Pacific Tour

Californians Preparing for Independence Day Events

INDIANAPOLIS, IND., July 1—*Special Telegram*—The Indiana Pacific tour started here this morning with the following eighteen participants:

Marion, No. 7—W. McK. White, P. W. Williams, A. S. Blakeley; H. W. Nichols, driver.

Marion, No. 8—J. B. Dudley; E. C. Gager, driver.

Pilot Sixty, No. 20—G. Fred Smith, Charles Kent, Ed. Spooner; Russell Gaar, driver.

Haynes, No. 12—R. Crawford, Elwood Haynes, C. A. Branston; L. R. Wagner, driver.

Haynes, No. 13—W. J. Morgan, T. L. Tincher, George Strout; F. R. Wagner, driver.

American, No. 1—Ernest I. Lewis, D. L. Moble; Charles Boyden, driver.

American, No. 2—Ray Price, Dr. C. R. Strickland; Eddie Gouth, driver.

McFarlan, No. 16—A. Dixon, Guy C. Core, Christopher Cox; Bert Adams, driver.

Marmon, No. 22—Carl G. Fisher, Charles A. Bookwalter, Robert Tyndall; Hine Schoeller, driver.

Apperson, No. 18—Eddie Edenburn; Max Winters, driver.

Henderson, No. 3—D. M. Bell, Reed L. Parker, Allen C. Rankin; Ray Harroun, driver.

Henderson, No. 4—Frank Staley, W. S. Gilbreath, R. P. Henderson, driver.

Empire, No. 10—Cecile Gibson, Harlow Hyde, J. M. Cooley; Joe More, driver.

Pathfinder, No. 14—W. O. L. Westgard, Bruce Daniels, Fred Wellman; Robert Speigle, driver.

G. & J. Truck, No. 15—J. E. Blickert; Walter Weidley, driver.

Stutz, No. 5—Stanley Bohannon, Douglas Wheeler, W. J. Bobyne; Lon R. Smith, driver.

Premier, No. 9—H. M. Love, John Orman, J. M. Ward; Ray McNamara, driver.

Premier, No. 11—A. L. Westgard; "Speedway" Duncan, driver.

Brown Truck, No. 21—W. W. Harrison; J. Holloway, driver.

Milwaukee Automobile Club Wins Run

MILWAUKEE, WIS., June 30—The Milwaukee Automobile Club won the Wisconsin Motorist trophy in the first annual competition for this prize between the two M. A. C.'s, the Milwaukee Athletic and Milwaukee Automobile Clubs, on Saturday, June 28, by a score of 172 to 81. The clubs were each represented by a team of 11 cars, and the route was 115 miles, starting from the Athletic Club in the heart of Milwaukee, going to Lake Geneva, around the lake, and thence to the Automobile Club in Wauwatosa. Six cars, three on each team, were penalized, most of the points being assessed under the rather severe rule that no water be taken on at any time during the run without a penalty of 25 points for each occurrence. As the day was a scorcher, the temperature being near 100 F., several cars ate up their radiator supplies several times. The score:

Milwaukee Automobile Club

No.	Car	Entrant	Score
1	Stevens-Duryea	Faustin Prinz	25
3	Mitchell 2-4	Dr. C. M. Marcan	55
5	Chalmers 40	Oscar F. Fischedick	Perfect
7	White 30	Henry O. Stenzel	Perfect
9	Mitchell 48	Leonard E. Meyer	Perfect
11	Stoddard-Dayton	Oscar Stegeman	1
13	Maxwell 30	Fred Gettelman	Perfect
15	Locomobile	W. E. Haefner	Perfect
17	Hupmobile 32	C. A. Carpenter	Perfect
19	Overland	Dr. H. S. Roby	Perfect
21	Chalmers 6	Aubrey G. Maguire	Perfect

Milwaukee Athletic Club

2	Maxwell Six	John McDonald, Jr.	53
4	White 40	M. C. Moore	Perfect
6	KisselKar	John Fitzgibbon	Perfect
8	Simplex	August Gesser	Perfect
10	Cadillac	Stephen Eller	Perfect
12	Stutz	Con. Raulf, Jr.	86
14	Winton	A. L. Fiefer	Perfect
16	Pierce-Arrow	H. H. Cutler	Perfect
18	Abbott-Detroit	Roy V. Rice	Perfect
20	KisselKar	R. R. Johnstone	32
22	Stutz	Geo. Leiser	Perfect

The Athletic Club team bought a dinner at the Automobile Club for the winners and immediately challenged them to a second competition to be run in September. It is likely that the route will be to Chicago and return.

To Hold Brighton Beach Race Meet

NEW YORK CITY, July 1—On July 15 the Motor Dealers' Contest Association will hold a motor racing meet on the 1-mile circular track at Brighton Beach, the program for which is now being worked out.

Los Angeles-San Francisco Race

SAN FRANCISCO, June 25—The race between Los Angeles and San Francisco on July 4 bids fair to be the greatest road race ever held. The distance is exactly 500 miles, stretching through the most thickly populated section of California, and the entry of fifty-three cars in the event is pretty nearly a record breaker.

No less than thirty different makes of cars are entered, and the cars range in size from a little Metz to a 120-horsepower Fiat and the big Simplex. The present record between Los Angeles and San Francisco is 14 hours flat. It is not expected that this record will be broken in the race because of the action of the supervisors of Santa Clara and Alameda counties in refusing permission to the cars to race over their roads.

The entry list follows:

No.	Car.	Drivers.
1.	Cadillac	C. P. Soules—A. G. Morse
2.	Simplex	Al Faulkner—F. Landnoffer
3.	Cadillac	A. A. McKee—Oscar Staab
4.	Apperson	W. W. Bramlette
5.	Simplex	Omar Teft
6.	Cole	H. J. Pink—Thos. S. Snead
7.	Fiat	Barney Oldfield—G. Hill
8.	Cadillac	T. J. Beaudet—F. Terry
9.	Fiat	F. Verback—H. Ham
10.	Mercer	Gaston Morris
11.	Macomber Rotary	Leach—Seazinghini
12.	Mercer	H. J. Raymond—J. Mathe
13.	Locomobile	O. Davis
14.	Overland	Thomas McKelvy
15.	Mercer	G. E. Ruckstel—N. Bedilion
16.	Tourraine	L. L. Monroe—R. Terry
17.	Simplex	Harris Rapp—J. Ruddle
18.	Buick	Louis Nikrent—F. Nikrent
19.	National	Alvin Mitchell—J. Delano
20.	Kissel	Roger Stearns—O. W. Kern
21.	National	E. Swanson
22.	Winton	Dave Kapuczin—Bob Evans
23.	Moon	Gochenouer—J. P. Lines
24.	National	George R. Cassin—S. V. Cox
25.	Lancia	E. T. McConner
26.	Reo	Earl Jackson
27.	Chalmers	Thomas Davis
28.	Simplex	E. Kerrigan—Roy Mullenhos
29.	National	C. F. Stitt
30.	Alco	R. Chandler—W. H. Carlson, Jr.
31.	National	H. A. Brisco—Bob Adams
32.	Alco	Domino Basso
33.	Apperson	Hanshue—Herrick
34.	National	C. G. Patmon—W. R. Barcroft
35.	Pullman	G. M. Williams—H. I. Proffit
36.	Michigan	Bruce—Stringfellow
37.	Chalmers	C. R. Zacharias
38.	Stearns	E. H. Cody—Fred Brown
39.	Welch	F. W. Gage—R. W. Stadlman
40.	Stutz	
41.	Mercer	R. A. Wherrit—C. M. Bennett
42.	Stutz	Quinn
43.	Ford	Carl P. Schneck
44.	Stutz	
45.	Buick	E. S. Waterman
46.	Metz	
47.	National	Wellgren—Carleton
48.	Pope-Hartford	
49.	Knox	Orrill—Herb Brown
50.	Stutz	
51.	Pope-Hartford	Jack Fleming
52.	Stutz	Earl de Vore
53.	American	Leo M. Nevis

Medals for 500-Mile Non-Stop

CHICAGO, July 1—To drive 200 miles in 10 hours without a motor stop and without going outside of your own state to do it may sound easy, but in the opinion of E. C. Patterson, the Chicago sportsman who brought Pilette over for the 500-mile race and who is importing Hemery for Elgin, it is a feat worthy of recognition. Believing that such a proposition will appeal to the sporting side of the average motorist, Mr. Patterson has offered to give a medal to every owner not in the trade who accomplishes it.

To properly launch the idea the Chicago Automobile Club, of which Mr. Patterson is a member, and the Wolverines of Detroit will start the movement with formal attempts to do the double century under these conditions. The two clubs will select a day this month and endeavor to be first to win the Patterson medals by sending out several cars.

In a way, the idea is similar to the Century Road Club of America that flourished in the cycling days. Any owner may make the attempt regardless of club affiliations and in any state in the union. However, before an attempt may be made Mr. Patterson must be notified and an observer appointed. If the drive is not made on the date scheduled a forfeit of $5 will be exacted, but if the trip is successfully made, then Mr. Patterson will present the medal without cost to the man making the drive.

It is stipulated that the drive must be made in the state in which the driver lives, and that the same stretch of road cannot be used more than twice. The motor must be run continuously, even when taking on gasoline, and the driver must make his own repairs, and on the road at that. However, he may have help from some one in his car in case of tire trouble.

Immediately after the Chicagoans and the Detroiters make their initial drive a permanent organization will be effected, officers elected and the entire country invited to try for the Patterson medals.

Many Entrants for Montamara

TACOMA, WASH., June 28—With nine entries for the Intercity Century, eleven for the Golden Potlatch trophy and nine for the big Montamarathon free for all, and 5 days yet to go before entries close, the Montamara Festo race committee began assigning pits on Monday last preparatory to the start of the regular race practice on the Tacoma course. A total of twenty-one cars have entered to date. There are from eight to ten entries yet to come.

Events.	Car.	Driver.	Piston Disp'ment, cu. in.
Century	Cole	Taucher	302.2
Potlatch	Stutz	Cooper	400
Montamarathon	Stutz	Cooper	400
Century	Stutz	Unknown	389
Potlatch & M.	Locomobile	Welch	471
Century	Stutz	Cameron	389.9
Potlatch & M.	National	Taaffe	448
Century	American	McLeod	389
Century & P.	Apperson	Nichols	318.1
Century	Buick	Loybold	165.5
Potlatch & M.	Nyberg	Endicott	377
Montamarathon	Fiat	Tetzlaff	750
Potlatch & M.	Fiat	Lewis	600
Potlatch	Fiat	Tetzlaff	600
Montamarathon	Keeton	Burman	750
Montamarathon	Benz	Carlsen	600
Century & P.	Hudson	Hanson	389
Century & P.	Ballard	Ballard	318
Inter City	Inter-St	Latta	389.9
Potlatch	Romara	P. Barnes	307
Potlatch & M.	Mercedes	Burman	389
Montamarathon	Tulsa	Hughes	389.9

Burman Breaks Dirt Track Record.

PORTLAND, ORE., July 1—It is reported that Bob Burman broke his own world's record for 1 mile on a dirt oval today, making the distance in 48.1 seconds. His previous record was 48.62 seconds, made at Brighton Beach, September 2, 1912.

More Entries for National Tour

MINNEAPOLIS, MINN., June 30—Entries continue for the national reliability run to Glacier National Park from the Twin Cities. The R. W. Munzer & Sons Co. entered another Hupmobile for the run. Warren Munzer will drive one car and Clarence Munzer the other. They were the two drivers that won the Daily News cup for runabouts last year in the state tour to Winnipeg. Tom Hamlin, who drove the Hupmobile around the world in 1910, is to accompany the Munzers and Frank Mooney, publicity manager for the Hupp Motor Car Co. B. E. Stimson, for the Minnesota Motor Car Co., has entered a Little car and J. A. O'Brien a Moon. Several individual entries are pledged, and the list will be closed early next week.

Martin and Agan Killed Testing

INDIANAPOLIS, IND., June 30—While trying out a new race car at the Indianapolis Motor Speedway last Thursday, Harry Martin, a driver and mechanician for the Stutz Motor Car Co., was instantly killed, and Frank Agan, his mechanician, was injured, probably fatally.

Martin had relieved Gil Anderson at the wheel, and after he had made a few laps Harry Stutz signaled for Martin to stop. On the northwest turn a tire blew out, sent the car against the wall and the car turned over, pinning Martin and Agan under it. The speed of the car at the time of the accident is said to have been about 70 miles an hour.

Martin was Joe Dawson's mechanician in the 500-mile race which Dawson won in 1912, and it was his ambition to drive in the race next year. In this year's race he was mechanician for Charles Merz, who made such a sensational finish in a Stutz, finishing third with the car on fire. Agan has been mechanician for Gill Anderson for some time and was with Anderson in the Stutz that went out of the 500-mile race this year in the 188th lap.

Many Entries for Badger State Run

MILWAUKEE, WIS., June 30—The Mitchell pathfinder for the fourth annual Wisconsin State A. A. reliability for the *Milwaukee Sentinel* and Emil Schandein trophies, returned to Milwaukee June 26 after covering 824 miles, which will be the distance for the tour on August 18 to 22.

It is probable that the *Milwaukee Sentinel* trophy, a $1,000 mug of gold and silver, will be put up for final competition this year, as Charles F. Pfister, owner of *The Sentinel* and donor of the cup, contemplates offering an even more expensive and elaborate prize for 1914 and succeeding years.

George Robertson, the famous racing driver, starting the tire race at the J. S. Bretz outing

The Automobile

PUBLISHED WEEKLY

Vol. XXIX Thursday, July 3, 1913 No. 1

THE CLASS JOURNAL COMPANY
H. M. Swetland, President
W. I. Ralph, Vice-President E. M. Corey, Treasurer
231-241 West 39th Street, New York City

BRANCH OFFICES
Chicago—910 South Michigan Avenue Detroit—505 Free Press Building
Boston—1035 Old South Building Cleveland—415 Swetland Building
Buffalo—808 Iroquois Building

EDITORIAL
David Beecroft, Directing Editor
Donald McLeod Lay J. Edward Schipper
Sydney Oxberry Hans W. Weysz
L. V. Spencer, Special Representative, Detroit

Francis L. Wurzburg, Advertising and General Manager

ADVERTISING
H. J. Garrison, New York C. H. Gurnett, Chicago
F. B. Barnett, Cleveland F. J. Robinson, Chicago
W. L. Chapman, Boston L. G. Vogel, Detroit
C. K. Brauns, Buffalo

Cable Address---------- Autoland, New York
Long Distance Telephone---------- 2046 Bryant, New York

SUBSCRIPTION RATES
United States and Mexico ---------- One Year $3.00
Other Countries in Postal Union, including Canada ---------- One Year, 5.00
To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order, or Register your letter.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

A Lesson in Fuel Economy

IDEALS are our greatest sources of inspiration. Without them we become prosaic. We need the high spots in order to make our average reasonably high. We need the mountain tops in order to take away a little of the monotony of the plain.

We passed a milestone last week in fuel economy when a car specially fitted out for economy made an official test and averaged over 83 miles to the gallon of fuel. When an 18-horsepower car can do this it shows us what the range of possibility is. It is true that hundreds, and perhaps thousands, of drivers would not derive any pleasure from driving a car over the roads such as this one had to be driven over to get such mileage. Grant this and still we have inspiration, a direction in which to aim. If a certain design of body, certain carbureter adjustments, certain methods of driving will give such phenomenal results there is something for each of us in such work. We do not hope to equal it, we may not even approach it, but it tells us of what the possible is; in other words, it adds one more touch of the interest which is always found in the victories that lie ahead. The pleasure of accomplishment is one of the greatest in the world. If everything were accomplished all interest would be dead. We are indebted to the Franklin company for what it has done, and hope that it will continue its work and so inspire other makers.

France Favors Long-Stroke

ADVICES from a majority of the French automobile factories show that for 1914 the majority of the makers are favoring a further increase in cylinder strokes with the bores remaining practically as during this year. The most popular policy seems to be an increase of approximately 10 millimeters in the stroke, this being little less than 0.5 inch. As might be expected, the horsepower rating will remain practically the same as this year, although there will be a perceptible increase in piston displacement, a fact which does not figure in the calculation of horsepower.

The four-cylinder motor will be the big leader in that country according to the canvass that the Paris representative of THE AUTOMOBILE has made during the last 6 weeks. It is possible to make such statements early this year due to the annual Paris show or salon coming in October instead of in December as formerly. The six-cylinder motor gives little promise of any numerical increases so far as the number of concerns using it is concerned. On the other hand, a new movement is showing itself, namely, the eight-cylinder motor. One of the leading French builders has manufactured the eight-cylinder in several models for several seasons, mounting the cylinders V-fashion in blocks of four at either side. Using this number of cylinders a most powerful torque is obtained. Small cylinders are used, 2.5 inches being large enough for a medium-sized car.

The eight-cylinder motor is not the complication that many imagine it to be. The crankshaft is much shorter than in a six-cylinder type and is much simpler, and consequently more robust. There are two connecting-rods attached to each throw of the shaft, so that from a construction viewpoint it is practically on a par with a shaft for a four-cylinder car, with the advantage that it is slightly shorter.

A commendable advance of French design for next year is the more general use of pressure oil feed to the crankshaft and connecting-rod bearings. The hollow crankshaft is receiving general attention and higher oil pressure, with the splash idea eliminated is being used. This system has the advantage of entirely eliminating smoking and being more economical in the use of oil. The amount of oil circulated is being slightly reduced in order to give it more time to cool between circulations. There are a few examples of leaving off mudaprons beneath the motor in order to expose the crankcase to air cooling and a few makers are ribbing the under face of the case to aid in the cooling. All of these ideas are excellent.

France is still lagging behind in self-starters. The force of the movement has not struck her yet. But it will come, it is bound to come. Progress cannot be stopped.

The European likes shopping much more than the American. If an American buyer purchased a chassis, then took time to get a body designed and fitted, and then spent a week or two in shopping around on each of the various accessories that his car may need, he might expect to have his car ready to run for Thanksgiving. But as soon as the fully-equipped, ready-to-run American car gets a stronger hold the European maker will be compelled to fall in line.

Metropolitan S. A. E. Discusses Starters

NEW YORK CITY, July 1—At a meeeting of the Metropolitan section of the Society of Automobile Engineers, held at the headquarters last night, the starter papers presented at the last meeeting were discussed.

At the opening of the meeting Chairman Anglada stated that the next meeting would be August 28. He suggested that a clambake be held during the interval and stated that it was the idea of the governing committee to send out postcards to section members inviting them to attend.

W. P. Kennedy said that the society had just passed a milestone in its history. The visit of the British engineers had been an event which was not only of the greatest importance to the society itself but would be forever remembered as an important event in the lives of the visitors. Mr. Kennedy stated that the occasion had required a levelheaded executive to carry out the program of the entertainment and education. The man who had been selected was Arthur B. Cumner, and on behalf of the society a token in the shape of a watch made by the Pater-Fillipe Co. of Geneva was to be presented to him.

Mr. Cumner arose to accept the gift and to express his appreciation. He said, "I know it is a hackneyed phrase to say that I am surprised, but it is the truth. I do not believe that the personal pronoun should be used in this matter at all. It was we and not I who made the success of the entertainment possible. As Mr. Basil Joy of the British visitors said, 'The wonder of it all is in the organization.' Great credit is due the work done by the local committees and to Coker Clarkson, who attended to the great mass of detail work. I wish to thank you for this token of appreciation for any small efforts that I may have put forth."

Whitman on Motor Starters

In almost all cases the starter is at the present time considered as an engine auxiliary, and the starter maker can do no more than suggest to the car builder the method of application.

With so many commonly used devices and sources of energy available the starter makers have approached the problem from widely different viewpoints. Compressed air has been in use for many years in the starting of stationary engines, being admitted to the cylinder and causing the rotation of the crankshaft by pressure on the piston. When this system is used in automobile work it is applied by the car builder as an integral part. An air starter applied to an existing engine takes the form of an air motor driving the crankshaft by chain, gears or a ratchet device.

An ignition starter causes the ignition of the residual charge, or of a charge derived from a container and passing to the combustion space through a selecting valve, ignition occurring in the cylinder that is on the power stroke.

In a spring starter the crankshaft is rotated through its connection with the free end of an unwinding volute spring.

In an electric starter an electric motor drives the crankshaft, either directly or through chain or gears, a storage battery being the source of energy. The motor and generator may be separate units, or may be a unit combining the functions of both, and current regulating devices are a necessity.

The starters that will be described by the speakers who will follow fall under one or the other of these classifications.

Joseph Anglada, in opening the discussion, stated that the object of the meeting was to bring out the differences between the different types of starters, to show if possible the weak points of those of a given design and the reasons for adopting prevalent practices. He stated that there were several live questions which should be answered at this meeting and that the discussion should follow along these lines. These questions were as follows:

1—What are the advantages and disadvantages and reasons for adopting a 6-volt system?

2—Why does the single unit system combining cranking motor with generator not meet the requirements to every one's satisfaction?

3—What are the advantages and disadvantages of a permanent gear connection between cranking motor and engine?

4—What are the weak points and advantages of the over-running clutch?

5—Which is better for a cranking motor, a two or four-pole type?

6—Is it necessary to make a special provision to take care of back kicks?

7—What is the proper gear reduction between cranking motor and crankshaft?

This question was prompted by the fact that existing gear ratios vary all the way from 2.5 to 1 to 40 to 1.

Chairman Anglada called for some one to ask a question to open the discussion. H. W. Slawson proposed the question as to why there was such a variety of cranking speeds. Some starter makers believe that the crankshaft should be turned over at 40 revolutions per minute and others over 100

Leonard Kebler of the Ward Leonard Co. stated that the crankshaft should be revolved more than 75 revolutions per minute in order to secure good carburetion and that it required but little added power to raise this to the more desirable figure of 90 or 100.

E. V. Hartford asked if this figure referred to the speed of the crankshaft over the maximum compression point.

Leonard Kebler stated that the speed varied little in passing the maximum point of compression.

E. V. Hartford stated that it was his experience that in the ordinary cranking motor which revolved the crankshaft at 80 revolutions per minute that the speed in passing the compression point dropped to 15 revolutions per minute momentarily and that in his opinion Mr. Kebler was entirely mistaken in his opinion that the speed varied so little.

A running debate on this point between Messrs. Hartford and Kebler as principals did not seem to bring forth any definite idea except that there was a wide difference of opinion regarding the amount of momentary speed variation as the crank passed over upper dead center on the compression stroke. In response to a question regarding the use of the compression release for minimizing the maximum load, Mr. Hartford stated that the gain was not worth the added difficulties in introducing a rich mixture into the cylinders.

A. L. McMurtry stated that the speed was varied to suit the ideas of the car manufacturers and that the starter designers had followed the wishes of the engineers of these concerns. He also stated that the question of voltage was of great importance and should be debated freely.

H. W. Slawson asked if the difficulties of running at low speed were due to troubles in the way of carburetion or ignition.

Leonard Kebler replied that only high speeds were required when the cranking motor was used lirectly with the magneto and that no difficulties were experienced when the battery ignition was switched on.

Frank Conrad of the Westinghouse Co. stated that it was necessary to prime the curbureter with the gasoline which we are now using. Therefore the attachment of a priming device in connection with the stirring outfit would be highly advantageous. At this point the discussion drifted back to the question of speed in passing the maximum compression point with no better results in the way of definite information than before.

Joseph Anglada proposed the question as to why we do not hear more of the air and spring type of starters, especially those which are doing such fine work in the marine line. He asked if any air starter men were in the room who could give some explanation of this.

Mr. Merrill, who is working on an air starter, stated that he had found it was possible to crank a motor over a compression point of 88 pounds with a pressure of but 50 pounds of air in his tank.

A. L. McMurtry stated that he was opposed to anything over 6 volts on account of the added complications of the system. In the first place, it was necessary to use a switch to bring down the voltage and the larger number of cells required and the difficulties which prevented the use of a single ground wire all stood in the way of a system using more than 6 volts.

Mr. Struthers stated that he believed in a higher voltage because it is easier to secure a machine of higher efficiency. He stated that the big feature in increasing the efficiency was to eliminate computation difficulties and also to reduce the heating of the armature winding. He has found that in cranking on the magneto it was easier to start on a low-tension magneto than on a high-tension.

Herbert Chase asked if the more rugged filaments of a 6-volt lamp were not a strong point in using the 6-volt system on account of the consequent longer lamp life.

A. L. McMurtry stated that it was easier to focus a 6-volt lamp because the filament was shorter and hence could be concentrated at the focal point of the parabolic reflector.

Joseph Anglada called for the discussion on the question of roller clutches.

F. C. Wolff of the Gray & Davis Co. believes that the jaw clutch is preferable to the roller clutch, stating that practical difficulties were always found with the latter device.

Frank Conrad stated that he believed the roller clutches were necessary at higher gear ratios.

A. L. McMurtry stated that the chief difficulty with the roller clutch was that when the motor reversed lightly in stopping the rollers were jammed into the guides and something had to give away or at least a loud clashing noise would result.

Back Kick Device Unnecessary

Mr. Haskell stated that he believed a back kick device to be unnecessary as long as the gears were made strong enough to withstand the effects of a back kick. The difficulties with the roller clutch could be overcome by having the rollers only go into their position by centrifugal force allowing them to drop out when the speed of the motor fell to zero as it would momentarily before the engine reversed. If this was done it was his belief that the roller clutch was more desirable than the jaw type.

Leonard Kebler stated that gears which are made large enough will stand the effects of a back kick without trouble.

Mr. Madison stated that it was not the gears that gave trouble but the keys holding the gears which would eventually work loose if they were called upon to do the work of taking up back kicks very often.

Frank Ashley stated that the key difficulty could be eliminated by mounting the gears on a cone with a wedge key and then pulling them up on the cone with a jammer nut.

A. L. McMurtry suggested that it was more trouble to use some of the present starting systems than it was to get out and crank the car. He stated that he knew of a system that it was necessary to first fix the carbureter to its starting position, then to arrange the ignition device and after that to use particular pains to work the starting lever correctly, all of which took more time than it did to pull up on the starting crank. He asked if the use of an extra jet in the curbureter for starting purposes would not eliminate many of the starting difficulties and be comparatively simple if this jet was automatically thrown into operation by the use of the starting lever.

Leonard Kebler stated that he thought that priming devices should not be necessary and that he did not agree with the practice of fitting acetylene tanks for priming purposes.

It was then suggested that the rest of the discussion on this question be written after a more complete digest of the papers was possible. This suggestion was carried and the meeting closed with Mr. McMurtry's talk on the opinion held by British visitors at the close of their trip to America.

RIGHT ANGLE TURN

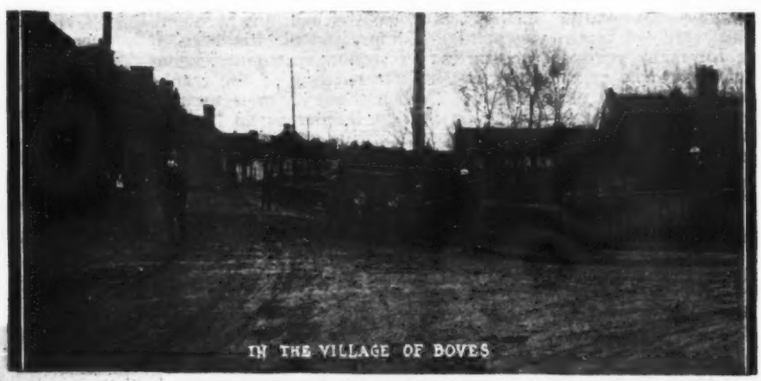
Views Along the Course of

EIGHTY miles north of Paris is the triangle forming the set of roads on which the next French Grand Prix race will be held, July 12. The village of Moreuil is merely skirted, the cars making a sharp turn to the right, leaving the village on the left and entering the longest leg of the course. This is a national highway, measuring 8.8 miles, being of a moderately winding nature and having very slight gradients. It runs through three small villages, Thermes, Berteaucourt and Boves, and twice passes under the railway, which for a considerable distance runs parallel with the course, first on the outside, then on the inside, and finally on the outside. The first turn under the railway is moderately easy and can be taken at some speed; the second turn is distinctly in the form of an S, the passage under the bridge calling for some skilful handling of the car.

Towards the end of the first leg, the road becomes parallel with the second leg of the course, the distance between the two being only about 130 yards. This forms a tongue of land about .75-mile long, all of which has been secured by the racing board for the erection of stands and tire and gasoline stations. The cars can be seen approaching on the lower road, watched up to the turn, and seen for a long distance on the second leg. To add to the interest of the race it is proposed to avoid the use of the hairpin turn and build a special banked road to unite the two parallel tracks.

Amiens is three miles from this point of the triangular course, the cathedral being clearly visible from the stands. Being on the main line and having one of the best train services in

A TURN IN DOMART

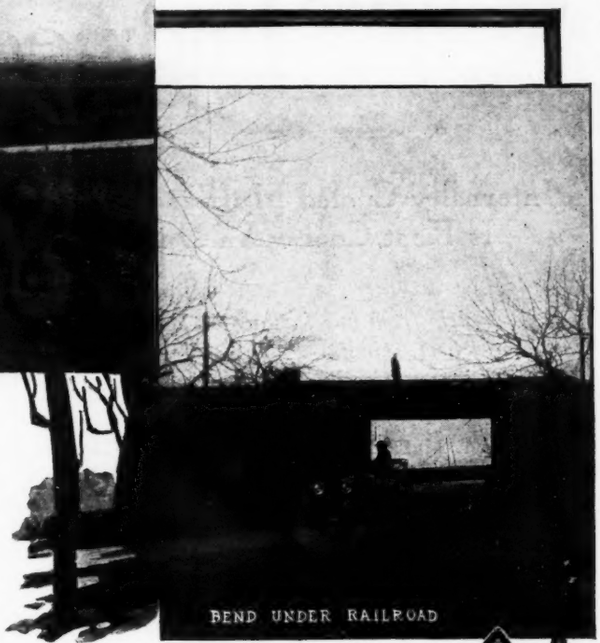


IN THE VILLAGE OF BOVES

RIGHT ANGLE TURN AT MOREUIL

WHERE STANDS WILL BE ERECTED

A DIFFICULT CURVE



BEND UNDER RAILROAD

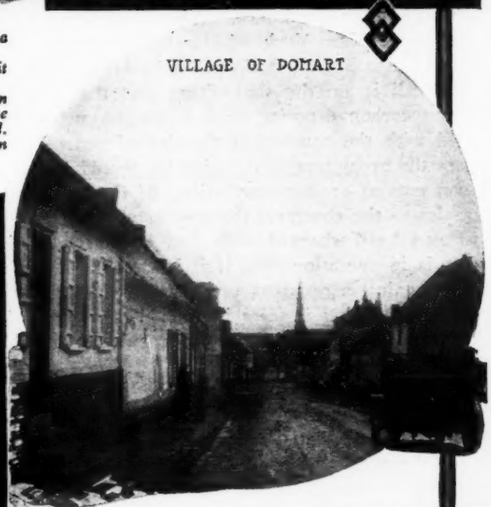
1913 French Grand Prix

France, it is possible to bring spectators from Paris in 80 minutes and from London in 3.5 hours.

The third leg of the course is practically a dead straightaway of eight miles, only one village, Domart-sur-la Luce, being traversed. A couple of miles past Domart, the main road is suddenly abandoned, a sharp turn being made to the right on a cross-road, which is at first wide without trees or hedges, and later rather narrow with a passage through a wood. All the trees lining the road at this point will be cut down, leaving ample room for cars to pass at speed. The latter portion of this course is a picturesque and rather winding descent towards the village of Moreuil, the only township of any importance on the course. Just before the right-angle turn into the first leg of the course the road becomes level. Although the roads are very wide at this point, the turn is not a particularly easy one, for it is followed by a short, steep upgrade.

On the whole the roads are not very hilly. The racers, however, will doubtless find it necessary to make seven or eight gear changes per round of 19.5 miles.

The important manufacturing towns of the north of France and of Belgium are within easy reach of this center. The task of getting spectators to the course is simplified by the presence of a railway station on the main line within a quarter of a mile of the grandstand. The special banked road which unites the two parallel tracks will allow the change from the first to the second leg to be made at speed.



VILLAGE OF DOMART

A COURSE THROUGH THERMES

IN BERTEAUCOURT

IN THE TOWN OF BOVES

The Engineering Digest

An Internally Cooled Muffler and Its Effects—How the Helium Two-Cycle Motor Is Kept Cool—An Underslung Peugeot With Straight Worm Drive

Many models from one factory—Machining of a steering-wheel spindle—Hydraulic clutches and transmissions—Miscellaneous notes

ANOTHER Muffler Which Increases Power.—As more and more mufflers are brought into the market which increase the power of the motors to which they are applied, even at high motor speed, those who take offense at the open exhaust in motor boats, aeroplanes, motorcycles, automobiles and stationary factory motors are getting a better and better cause against the offenders. The burden of proof is put on the shoulders of all who claim hidden virtues for a practice which constitutes a nuisance. Whether it is a crowd of taxicab chauffeurs in New York who make the neighborhood hideous from 1 to 2.30 o'clock in the night by blowing off their motors, as they call it, on the supposition that the operation helps to blow out carbon deposits, or it is an automobile race which is enacted with the continuous thunder of roaring exhaust pipes, because the promoters of the occasion would not want to violate the conventions or the expectations of the onlookers by passing any rules to the contrary, the now established fact that the exhaust can be discharged with less back-pressure if a suitable muffler is in operation than if it is expelled directly from each cylinder against a resistant atmosphere, without getting a chance to cool first, makes it seem improbable that any of the alleged technical justifications for the open exhaust could be substantiated by test.

So far as racing is concerned, the fact that no car can be driven at its full capacity for speed, but must be held back more or less, and that its chance to win depends upon its ability to hold the road and upon the sense of security it can impart to its driver through this property and its steering qualities, would now in itself leave no good technical reason for open exhausts, even if it might be shown that the best of mufflers consumes a little power when the motor is running at speeds above 1500 revolutions per minute. That it might be unwise to rob the race of the roar is another matter. Also, that all mufflers are not as suitable as could be wished and that the cleaning of them is more of a task than it should be.

The particular muffler which brings this subject to the surface is one called the W. X. which was tested at the laboratory of the Automobile Club of France on March 8 this year. The exhaust pipe E extends two-thirds into its length and is perforated with holes aggregating at least the area of the cross-section of the pipe. Concentric tubes, also perforated, are secured to transverse circular plates, as shown in Fig. A and are formed with conical nozzles permitting a portion of the gases to escape directly at the end of the device. This creates a suction by which air is drawn in between the tubes through holes in the first transverse plate. The characteristic feature of the muffler is this provision which serves to cool the interior of the drum and thereby the gases.

At the test the muffler was tried at three different motor speeds, the motor being operated each time without the muffler first and then with the muffler attached. At 920 revolutions the muffler increased the power 10.4 per cent., at 1000 revolutions 8.2 per cent. and at 1160 revolutions 5.5 per cent. The small motor—a four-cylinder 75 by 120 millimeters—developed only from 7.22 to 8.54 horsepowers, and it remains of course doubtful whether the muffler would show equal gains of power in the case of a larger motor. The dimensions of the muffler are not given.—From *Bulletin Officiel*, May.

TEST of Double-Acting Three-Cylinder Two-Cycle Motor.—Some of the construction features of the Helium two-cycle motor which was tested recently at the laboratory of the Automobile Club of France may be discerned from the two views given in Fig. 2. At a scale of speeds ranging from 610 to 1806 revolutions per minute this motor developed powers ranging from 12.04 to 34.07 horsepowers, and the greatest efficiency was recorded for the speed of 1227 revolutions at which 26.52 horsepowers was produced. The distributer valve did not at any time run hot.

A block casting contains the three cylinders which are of 77 by 100 millimeters bore and stroke, but whose length is increased by the space occupied by the piston. According to the proportions shown in the drawing the compression must be low and the space given up for the piston results in a large water-cooled area. The pistons are actuated by explosions from both top and bottom, the spark plugs for the lower combustion chambers being secured in the cylinder walls. Piston rods pass through a packed joint in the partitions which separate the motor-cylinders *a* from the cylinders *b* of larger bore, underneath, in which the explosive mixture is compressed. Each of the cylinders *b* is of sufficient capacity to feed fresh gas to two of the three motor-cylinders at a time [by which provision, it seems, a certain surplus pressure upon the fuel feed is created, so as to secure a good fill each time for each of the six combustion chambers, and in this connection it is noted that no record of the fuel consumption is given in the report of the test—Ed.]. The crankpins of the motor shaft are set 120 degrees apart, so that the three pump pistons work continuously in drawing explosive mixture from the carbureter through pipe *e* and subsequently sending it to the container *f* which is in common for the three cylinders. The rotary valve *g* works of course separately for each of the cylinders and seems to be so arranged that it connects the fuel pumps alternately with the carbureter and the container but never establishes a communication between the two latter. The container thus always holds a reserve of fresh gas which strikes against the deflector in each combustion chamber the moment the corresponding admission port is uncovered either during the up or the down movement of the motor-pistons, and as the ports leading to the exhaust manifold *j* are directly opposite—and naturally larger than the admission ports—the exhaust gases are chased out at the same time by the time-honored method which is usually held responsible for the deficient fuel economy which has discouraged the development of two-cycle motors.

The rotary valve turns at an angular speed one-half of that of the crankshaft and cannot be overheated, as it is always surrounded by fresh gas. It performs the functions for which 24

poppet valves would be required in a 12-cylinder four-cycle motor with an equal number of combustion chambers and equal distribution of the torque. The high-tension magneto *m* turns at an angular speed one and one-half times as fast as that of the shaft. The cylinders and the partitions separating them from the pumps are water-cooled and the exhaust manifold is ribbed to promote air-cooling and radiation.

[The power of a six-cylinder four-cycle motor with a total piston displacement twice as large but only one-half as many explosions would be about 22 horsepowers at 1250 revolutions per minute according to the A. L. A. M. formula.—Ed.]—From *Bulletin Officiel*, May.

—

WORM-DRIVE for One Peugeot Model.—In a new 14-horsepower Peugeot model some changes, as compared with the widely known 18-horsepower model of the same make, have been introduced which will attract general interest if only by reason of the strong position which this firm has gained in racing events. The motor is cast in block, while that of the 18-horsepower model is cast in pairs. The chassis of the new model is underslung and the service brake is operated by hand, the wheel brakes by pedal. The most important innovation, however, is the adoption of worm drive after extensive tests. The design is shown in Fig. 3. The worm is underneath, working in an oil bath, and is of the straight type; not hollow.

The motor is of 80 by 140 millimeter bore and stroke and turns normally at 1300 revolutions and up to a maximum of 1700 revolutions. The shaft runs in three parallel bearings. The valves are on the same side, the exhaust valves measuring 44 and the inlet valves 38 millimeters in diameter. The valve lift is 5.7 millimeters. The diameter of the valve stems, which are boxed in, is 9 millimeters.—From *Omnia*, June 14.

—

NEW Mercedes Models.—Some of the tendencies in European automobile manufacture are illustrated through the variety in models and equipment which is represented in the output of the German Daimler company, according to its announcement for the business year 1913-1914. It will place in the market 8 shaft-drive and 4 chain-drive models of automobiles besides 1 1-ton business motor vehicle and 1 ambulance.

The shaft-drive cars with poppet-valve motors will be built with 20, 25, 35, 50 and 60 horsepowers and those with Knight motor at first in a 45-horsepower size and subsequently also with motors of 30 and of 65 horsepowers. The chain-driven cars are to be of 50, 60, 80 and 95 horsepowers. Most of the cars are to be fitted with straight-front honeycomb radiators of the usual type, but the 45-horsepower and the 65-horsepower Knight-motor models can also be fitted with pointed radiators. The Mercedes double cone clutch with wedge control will be used for all models excepting the smallest, which will have the simple cone clutch.

Eisemann ignition is specified for the 20-horsepower car and for the 45-horsepower Knight-motor car, Mea ignition for the 25 and 35 horsepower shaft-drive cars and Bosch ignition for the rest; in all cases on the high-tension system.

The lengths and widths of frames, the wheel gauges and the wheel bases are given in the following table in millimeters, the length referring only to distance between front and rear transverse members:

Models	Length mm	Width mm	Gauge mm	Base mm
20 H.P. shaft-drive, poppet valves	2450	800	1320	2760
25 " " " "	2600	850	1350	3075
35 " " " "	2600	850	1350	3075
50 " " Knight motor	2755	880	1420	3430
60 " " " "	2755	880	1420	3430
30 " " " "	2600	850	1350	3240
45 " " " "	2600	850	1350	3240
65 " " " "	2755	880	1420	3550
50 " chain-drive poppet valves	2600	1030	1600	3475
60 " " " "	2600	880	1520	3475
80 " " " "	2600	880	1520	3525
95 " " " "	2400	880	1520	3380
95 " " " "	2600	880	1520	3580

Wood wheels will be the standard equipment with demountable rims optional. Complete wire wheel equipment must be specially ordered in advance. A special type of demountable wood wheels made to the company's own design will be supplied at an extra price when the arrangements for making them shall have been completed.

The 25-horsepower business motor vehicle with Mea ignition will have a load space 2800 millimeters long, a wheel gauge of 1420 millimeters and a wheelbase of 3380 millimeters. It is to carry loads of up to 1 1-2 tons, including the weight of the wagon body, and is intended for speeds up to 35 kilometers per hour when equipped with solid rubber tires, and higher with air tires. The ambulance is to have a 30-horsepower Knight motor and a maximum speed of 50 kilometers per hour. Both these vehicles are to have double-cone clutches.

The bore and stroke dimensions of the motors have undergone no change and are as follows, including the new models: For the shaft-drive cars with poppet-valve motors, the 20-horsepower 70 by 120, the 25-horsepower 80 by 130, the 35-horsepower 90 by 140, the 50-horsepower 110 by 150 and for the 60-horsepower 120 by 160; for the Knight-motor cars of 30, 45 and 65 horsepowers, respectively, 80 by 130, 100 by 130 and 120 by 140; for the chain-driven cars, the 50-horsepower 110 by 150, the 60-horsepower 120 by 160, the 80-horsepower 140 by 150 and the 95-horsepower 130 by 180. The three last models are known as colonial cars.—From *Allgemeine Automobil-Zeitung*, May 30.

—

MAKING the Steering Pivot.—The machining of steering spindle pins was long considered a job on which it was difficult to figure closely. So long as the steering arm was integral with the piece, the adjustments of the forged blank in

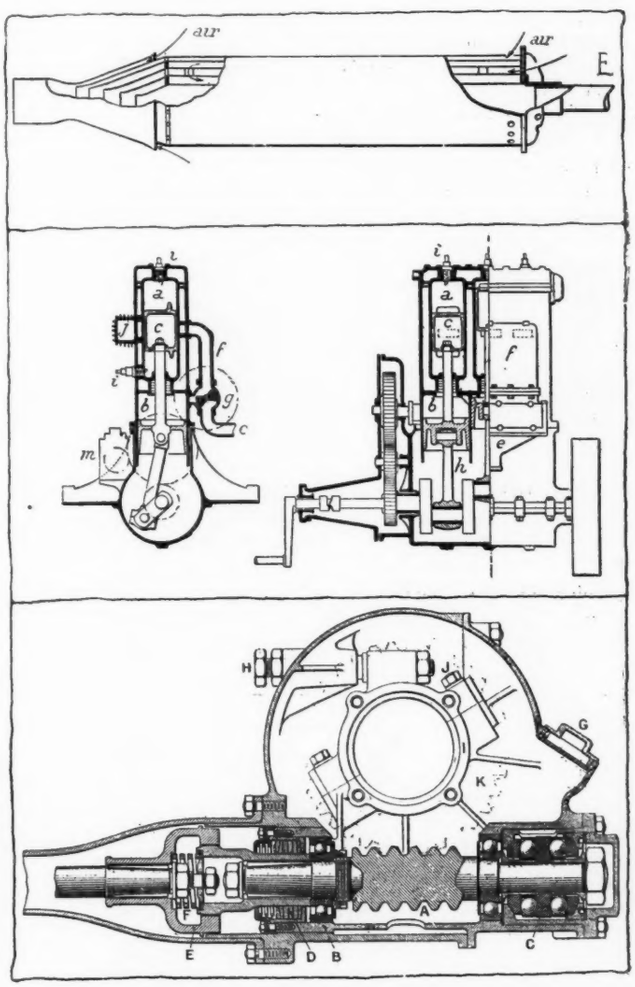


Fig. 1—WX power-saving muffler. Fig. 2—Helium double-acting two-cycle motor. Fig. 3—Peugeot worm drive

lathe and drill press were mostly done by hand and successive fittings, but since about 1904 the arm has usually been made separately and assembled with the rest by bolt and nut or, more lately, by electric or autogenous welding. Still the small angle of the wheel-spindle with the axis of the knuckle has made difficulties in many places when the requirement of having all like pieces strictly interchangeable began to be made. This meant automatic manufacture, on the principle that without automaticity in the process of production no true interchangeability can be expected. It meant a jig-tool rigging of some kind. As an instance of the progress which has been accomplished in German shops in this respect, and also as an example to show how the need of adopting automatic adjustments of the work in the machine tools has frequently led to the discovery of very handy methods which should have been obvious beforehand, there is described a method used in some German factories for the making of the steering knuckle, and it is interesting at least for comparison.

The blank, which has to be machined all over, has to have a through bore *a*, to which the wheel-spindle must stand at an angle of 87 degrees, and a hole *c* which breaks through the wall of the bore *a*. Fig. 4 illustrates the requirements.

The ends of the blank are first dressed and center-marked. Then there is placed a center in the drill press table, properly aligned with the bit, and the blank, upright on the center, is bored through from both ends in two operations. The piece can now be conveniently mounted on a vertical face plate. The latter (Fig. 5) carries a chuck D on the shank of which, *d*, the work is set up with the spindle *b* braced against an angle rest, and the work thereby gets a good propping for the machining of the projecting bearing of the piece. This done, the work is set up, centered by its hub on the face plate, while the spindle *b* is supported by the same angle rest used before, as in Fig. 6, and the bore is finished. With the same mounting, the space *e* for the knuckle-joint bolt is milled out.

There remains now mainly the machining of the oblique spindle *b*. To accomplish this part of the work, the piece is now set up with its hub-end against the angle rest, which has the required angle of 3 degrees, and the spindle is thereby brought into the center line and can be turned off as required.—From *Werkstattstechnik*, June 1.

—

Micrometers and Calipers—A symposium of illustrated descriptions of instruments of this nature compiled from periodicals and patents and comprising, in so far as possible, all recent improvements issuing from American and European manufacturers of note in this field, is presented in the *Revue de Mécanique* of May 31.

—

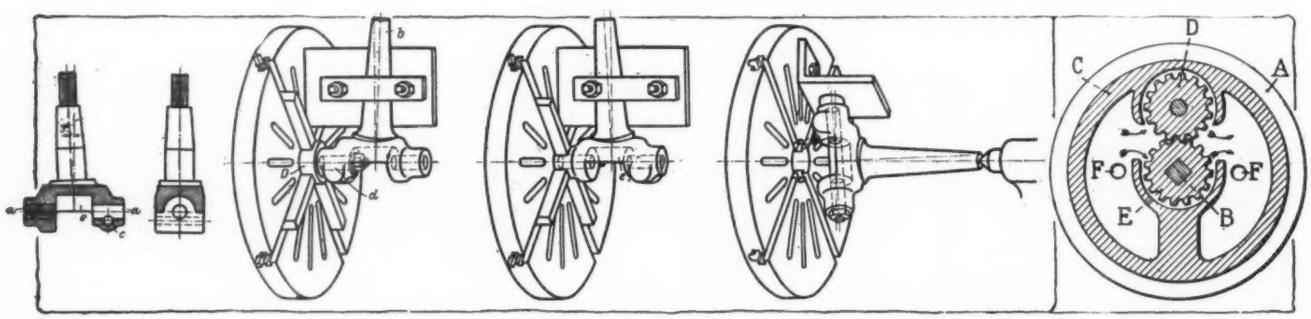
DIAGRAM of Hydraulic Clutch—In discussing the merits of all the known types of clutches for automobiles and motor trucks D. Renaud takes the construction represented in Fig. 8 as an example illustrating the principle of the hydraulic clutch and at the same time virtually showing a mechanism which time and time again, merely with changes in the details and with the principle veiled by complications, has been proposed as suitable for a hydraulic change-gear, but which lacks entirely the necessary property for this purpose; namely, that of increasing the torque transmitted when its speed is reduced by bypassing a portion of the liquid with which it is operated.

In this instructive illustration A is the flywheel of the motor and B the shaft to which it is to be clutched. On the flywheel there is mounted an oil-tight cylindrical box C with an eccentrically placed shaft upon which the gear wheel D is journaled, while upon the driven shaft E, which enters the box centrally, there is keyed a similar gear wheel, E, arranged to engage D and constituting a gear pump in conjunction with it, both being partially inclosed by close-fitting curved transverse webs in the box, so that the liquid set in motion when the gear wheels are rotated must enter between the edges of the curved webs on one side and must be discharged at the other side. The webs divide the box in two portions which are connected by a conduit FF formed in the bottom of the box, or as a connecting tube, and this conduit can be closed, partially closed or altogether opened by means of a valve under the control of the driver.

When the valve is open, the rotation of the flywheel makes the idle eccentric gear and the whole box C turn around the gear wheel E, and the liquid moved by the resulting relative motion of the two wheels passes from one side of the box to the other through FF without any other resistance than that determined by the skin friction and the strangulation of the liquid in the conduit. When the valve is gradually closed the resistance due to these factors eventually becomes so high that the relative rotary movement of the two gear pump pinions is retarded and the gear wheel E with the shaft B is forced to turn more or less with the box and the flywheel, the speed of its rotation depending on how much of the oil set in motion by the gear pump can be forced through the obstructed conduit FF. When the latter is completely closed, and the gear pump does not leak between the gear teeth and the inclosing webs or at the contact surfaces with the box, the two wheels are locked together, since they cannot be rotated in relation to one another without transferring liquid from one side to the other, and this transfer is rendered impossible by the closing of the conduit FF. Under this condition the clutch, then, holds tight. Between the two extreme conditions—the conduit entirely open and entirely closed—the whole gamut of slippage in any desired degree can be realized. The main practical difficulty, which accounts for the fact that hydraulic clutches are not yet in common use, lies in the prevention of internal and external leaks without setting up such resistances, for example in the bearing where the transmission shaft enters, as to make the clutch less sensitive than a good disk or cone clutch.—From *Le Poids Lourd*, June 6.

—

Headlights with white reflectors shed a light which is incapable of penetrating a fog, writes a correspondent to *Vie Automobile* and is informed in return that under a condition when the atmosphere is full of minute bubbles a gilt reflector will carry the light much farther than a silvered one, but that a similar improvement can be obtained by placing a yellow or green screen or glass in front of the lamp.



Figs. 4, 5, 6 and 7—The making of a steering pivot pin. Fig. 8—Diagram of hydraulic clutch

The Engineers' Forum

Defects in Springs

Part III

Reviews History of Vehicle Springs—Finds Springs Alone Are Inadequate

IN spite of the warm weather, several of the engineers are finding time to express their views on the subject of Defects in Springs in the discussion which is being carried on in the Forum. This discussion was started by several of the leading engineers on the appearance of the article entitled Defects in Springs, by G. H. Baillee in THE AUTOMOBILE for May 29. Car owners with engineering inclinations, spring and shock-absorber manufacturers and others are now taking up the discussion:

No Spring Can Do the Work Alone—Bronson

NEW YORK CITY—Editor THE AUTOMOBILE:—In his paper given in THE AUTOMOBILE for May 29, Mr. G. H. Baillee has pointedly and strongly presented and commented upon the most important problem yet unsolved in the attempted perfection of a "locomotive" which can be speeded over trackless roads with comparative safety from destruction of its own mechanism and carry its passengers in luxury, speed and comfort.

In viewing the present automobile spring conditions from the standpoint of a mechanical engineer, under the head of Defects in Springs he finds:

First: That "springs have received less attention from those who talk and write than any other part of the car."

Second: That "those **who do things** have been equally neglectful and remarkably silent about what they have done."

Third: That virtually "all springs are of the same pattern."

Fourth: That "automobile literature shows practically nothing of interest (concerning them) apart from the question of qualities of steel most suitable for them."

His conclusion is: "Now that cars have given up breaking down I consider springing the most important feature."

His premises stand well backed by his shop experiments, illustrated by mechanical drawings and his conclusions are fully sustained by public opinion strongly expressed by the existing "rage for auxiliary springs and shock-absorbers" among owners in their "endeavor to find out something about springs, which rage is evidenced by "the putting on of the first contraption an owner sees advertised," to such an extent, that "at the present time it is rare to see a car without a fitting of that kind, not belonging to the car, but stuck on, which means that the maker not having done his best in springing the chassis has left room for improvement which the owner tries to effect."

To my mind the accusation, that the maker has not done and is not doing "his best" in "springing the chassis" does him a great injustice. And I think that Mr. Baillee is urgently calling upon the manufacturer of cars to solve the problem of defective springs is putting up to him the most seriously important and already proven **unsolvable** problem that he has met with in his most intelligent and persistent efforts to perfectly satisfy himself and his patrons with his finished product.

No manufacturer will dispute his statement that "Now, springing is the most important feature." But, no manufacturer will acknowledge that he is now using defective springs.

Mr. Baillee has intelligently diagnosed the case from an engineer's standpoint, but has suggested no remedy. Hence, let us view it briefly from a **"Horse sense"** standpoint and see if possible whether the trouble and infliction of defective springs or of a bad case of **ineffective springs** is what we have to contend with, in face of the fact that the actual workings of springs are, after all, governed by natural laws, which even present-day engineering is powerless to overcome within them.

Modern Spring Is Evolution from Nature

The present-day leaf spring is an evolution from nature. The monkey or the Small Boy invented it to ride on or jump from. The Boy bent down a small sapling or tree, sat upon the top and teetered up and down on his **spring.** A companion came along, got on also and the spring broke under the overload. The Man, finding that his lumber or farm wagon rode hard over rough places, cut two small poles, fastened an end of each on each side near the rear of his wagon, secured a fulcrum under each near that end of the poles, nailed a board across the other ends to sit upon and if the poles were not too stiff had an easy spring to ride on. If he speeded his wagon over a rough place, the upthrow of his springs threw him off. If he took a friend on the seat with him and the poles were too light the overload broke his springs. Some iron worker bethought himself of using springy steel under the box of the wagon and thus through further evolutions came the carriage springs.

The carriage manufacturer built his vehicles with scant and fixed seating room for two, four or six persons and springed them to carry that load with springy ease and comfort at a speed of 4 to 10 miles per hour.

The automobile came with its roomy body built and springed to carry two or four people at a speed of 15 or 20 miles per hour with ease and comfort. Everyone wanted to ride, the load was doubled, the speed more than doubled and springs were broken. The automobile builder increased the weight and strength of his springs (in self preservation), and with the load of four or less therein the car rode like a cart. The business grew and a seven-passenger seating and a 40-mile per hour running capacity car was provided. The owner takes fourteen aboard (and as it is fun to speed), runs the car at a 60-mile clip and down go the springs bumping upon the axles, if they are sufficiently strong to support such overload. How will that car ride with the owner and wife alone in the tonneau? How can they keep their seats at even a moderate speed over average roads?

In the early days of the automobile business defective springs were so nearly the rule rather than the exception, that the term could be fairly used in a general way. But now, since the automobile manufacturers and their spring makers have learned from hard and expensive experience that their business hung upon the production and application of the very best springs that could possibly be made and to that end called the best scientific and

engineering talent in the world to their assistance in the securing of the highest quality of steel and the best forms and patterns that ingenuity could devise for springing cars to the best possible efficiency, defective springs have become a negligible quantity and ineffective springs an almost universal product. These are ineffective, because irremediably incompetent to fulfill the requirements for which they were honestly designed by the manufacturers of cars when subject to prevailing, customary and varying load and use; inefficient, because of their absolute inability to do all that is constantly required and expected of them by purchasers and users of cars.

Springs Affect Tires Tremendously

Mr. Baillee most aptly raises a question which has heretofore met with scant, if any, consideration by makers and users of cars, viz., the **effect of springs upon tires**, and expresses the well grounded belief that "tires are more affected by the action of springs than by anything else, both as regards wear and bursting." That fact is so incontrovertible that no experimental shop tests or "records of full-line curves," etc., are necessary, as everyone knows that a continual pounding of a heavy, solid, unyielding substance upon the best-made inflated and yielding tires must, and will, destroy them far sooner than they can, or will, be destroyed by equally heavy blows from the same initial weight, cushioned by an intervening elasticity. Then, too, we have positive proof of that in actual practice, in the established fact that inflated tire on heavy, almost springless trucks is so impossible that the use of solid tires thereon is nearly universal. It is also well known that the same make of tire often wear very much longer on one than upon another car of the same weight, same average passenger load, making the same mileage over the same roads. And the query is: Why? The answer is, because the one car is much better springed than the other and the weight of the blows upon the tire is greatly lightened before they reach it by the elastic resistance of the springs. And, in the reaction or upthrow of the springs the tire is continually and to a considerable extent relieved of both weight of load and blows.

That proper springing of a car is salvation to its whole mechanism and a protector and saver of its tires is beyond intelligent question, and the importance of having a spring no stronger than necessary has long been recognized.

Any first-class manufacturer will, upon special order, make a car of limited seating capacity geared down to a limited speed and springed to carry the specified load and guarantee it to ride as easy over any road as any carriage ever built, if it is driven with the care that is generally given to the carriage and horse.

But the automobile is the most cruely abused piece of well-constructed mechanism in the world. By almost unprecedented effort and skill its whole mechanism from engine, transmission of power, etc., down to its springs, has been brought so nearly to the verge of perfection that it withstands to a surprising degree the most reckless, careless, neglectful abuse ever put upon any machine that has become a convenience, a necessity and a pleasure to all.

Regulators Must Be Appled to Springs

But the springing of cars to satisfactorily meet the varying conditions of load and overload and of speed over streets and roads has not been and cannot be accomplished until the manufacturers are convinced that no spring can be made that can do it by itself alone, or without co-operative mechanical assistance. They very well know that the spring is governed by natural laws and that no matter what its form or fashion it can by itself do nothing other than to work in strict conformity thereto. They know that controllers, regulators or governors are always applied to great power and pressure producers and transmitters, yet they are averse to the application of any mechanical assistant to their inefficient springs in the performance of their overcharged duty.

This aversion is undoubtedly due to the fact that while friction is a well-known decrement to and a brake upon spring action, friction shock absorbers have been forced upon them or upon their cars. Some, however, of the most thoughtful and practical men in the business have frankly admitted that if some regulator that would both prevent the overaction of springs on the upthrow and elastically assist them in sustaining an overload on the downward movement, without interfering with the natural movement of the springs, was discovered, it would be an untold blessing to spring makers, car manufacturers and the whole trade.

Hence, under all the circumstances and in the light of the able criticisms and important points that Mr. Baillee has made, it may be interesting to know that such a regulator of springs has been discovered, tried out upon touring cars and 3-ton trucks and found to satisfactorily do all for which it was designed.—A. H. Bronson, Ball Bearing Shock Absorber Co.

Shock-Absorbers Sometimes Bad—Rankin

New York City—Editor The Automobile:—That most springs are broken on the rebound is common knowledge. When this fact is coupled with the condition that the severest jounces are due to the rebound, it surely is explanation enough for the existence of the shock absorber. So many times the stock inquiry, "Why do you put springs on a car and then restrict them with shock absorbers?" is heard. It is strange when the slightest study of the subject would seem to explain the spring action.

When a man catches a swiftly thrown baseball he does not intercept it with a rigidly outstretched hand but gradually absorbs the impact. The shock of the ball would break his hand were he to do otherwise. The spring is designed to act in the same manner. The energy of the impact is absorbed by making it do work. The work consists in bending the spring against its elastic resistance. When the work has absorbed all the energy and bent the spring back a large percentage of the original energy is now in the form of potential energy and the spring rebounds. Why should this rebound be expended in throwing the bodies of the passengers up into the air instead of being used in overcoming the resistance of a shock absorber?

The correctly designed shock absorber allows the spring to absorb the load gradually on the down stroke and absorbs the energy stored up in the spring on the upstroke. Over the smaller bumps in the road where the spring oscillation is small, the shock absorber should not come into action at all.

Where shock absorbers simply have the effect of stiffening the action of the spring they are worse than useless. They make the springs ride hard and transform an easy riding car into one which might just as well have the springs of an Irish jaunting car.

There is one point about spring design, however, which does not seem to have all the attention it deservese and that is the shape of the spring itself. A spring is, in mechanics, a double cantilever beam supported at the center and with the loads at the ends. According to all the laws of mechanics of materials the natural weak point for such a beam is its center. Why should the center be pierced by a bolt hole without any compensation being made in the sectional area of the spring? A perfect piece of mechanism, like the "one-hoss shay," should not be weaker at any one point than at another. In other words the spring should be a beam of constant strength throughout its entire length. To have this approximately so, the taper of the spring should be so arranged that the center is somewhat wider than is common practice.

The increase of good information in the way of heat-treating and the substitution of machine methods of heat measurement for the rather elusive test of color judgment by the eye is doing much to increase the quality of springs. Where these methods are used we are able to have thinner springs with more blades and have their action much easier. But we are still in our infancy as regards the suspension of our pleasure cars, though I hope to see important developments in this promising field in the near future, possibly due to the discussion now being carried on in The Automobile—Oliver Dunkin Rankin, M. E.

Rapid Painting of the Automobile

A 3-Day Job Is Possible, But Good Work Really Requires from 8 Days to 2 Weeks

Hot Air and Oven Baking Methods of Painting and Finishing Growing in Favor

IT is no longer possible to exact 3 weeks as a time schedule during which to paint and finish the automobile. Experts are beginning to chronicle facts to prove that the car can be painted in 3 days. Extravagant statements are to be taken for what they are worth, but it would be probably fair to say that the car can be painted, and durably painted, within a limit of time ranging from 8 days to 2 weeks. Only the car from which the paint must be burned off will require the 3 weeks' limit; and not much burning off of the old paint surface is now being done.

At any rate, car owners are unwilling to spare their machines from service longer than is absolutely necessary.

New methods and practices in painting and finishing the car are, therefore, uppermost topics in the public mind.

Oven Baking Not Yet Used on a Large Scale

The oven baking process is being in many quarters depended upon to solve the problem of getting the cars painted efficiently and quickly, although the process is not yet being employed upon a large scale.

The oven process is still in a more or less experimental stage. It will, of course, bake the paint and the finish but whether such a finish will prove durable remains, for the most part, to be determined.

Necessarily, when a new car is painted and finished complete in 3 days, great heat must be employed in order to get the eight or ten, and perhaps twelve, coats of paint and color and varnish in place and baked to stay there.

Not a few authorities both East and West have explained recently that the lower the temperature at which paint is baked, and the longer it is baked, the better the durability, the more elastic the film and the greater its moisture resisting strength.

One of the most qualified authorities in the Northwest on the baking process has recently stated that baking paint at 180 degrees for 12 hours will produce much more satisfactory results than the same paint baked at 290 for 5 hours. Excessive temperatures, the same authority insists, should be avoided.

For the steel sheet and the aluminum sheet car bodies, the baking method seems particularly suited. The life of paint baked on these metal surfaces is not only prolonged, but what is additionally important, these coats hold their original color and resisting strength better, it is claimed. Chemists after protracted experimental work declare that the baked-on surfaces of paint and varnish resist moisture, gases, atmospheric changes, etc., much more powerfully than if these same coatings were applied with a brush and air dried.

They are harder, firmer and more impervious to prevailing atmospheric conditions.

In the event of painting and finishing the surface with enamels —that is to say, with varnishes and colors properly combined and ground—perhaps neither great brilliancy of color or great depth of luster may be looked for, but that the surface may wear well and strong cannot be questioned.

With the steel street car it is not merely a matter of appearance, or finer color and unsurpassed finish, but the importance of protecting the metal with sufficient substantial coatings of pigment must be considered. Only recently in a great metropolitan daily it was charged that sheet steel and other metal body cars were rapidly going to the scrap pile for lack of permanent paint protection.

The universal demand not only from automobile owners and manufacturers, but from railway companies whose passenger car equipment of steel construction is giving constant trouble on account of rust and corrosion, is for a more ample and adequate protection from moisture, gases, and atmospheric poisons.

The railway companies are asking for quick work that looks well when finished and wears like the ancient truth.

The questions raised by engineers and chemists relative to steel, shows among other things, that steel has quite double the linear expansion of wood, hence the greater elasticity needed for pigments prepared for use on the steel surface. The oven enables the painter to use the more elastic pigments desired whereas without the oven it would be necessary to employ artificial driers in connection with the paint used on the metal surface.

In this demand for quick and good painting, however, readers of THE AUTOMOBILE are doubtless aware that with the use of one of the various quick surfacing systems now on the markets results on the metal surface can be made quickly and of the highest quality.

There are several rapid painting systems, consisting of primers, fillers, surfacers, sealers, color-varnish, etc., finding favor with automobile painters which for ordinary good work gets the car through the paint shop and into service in the course of 6 or 8 days. For better work which requires more coats of material, and a proportionate increase in the hours for drying and surfacing, the time limit will, of course, be greater, running from 12 to 15 days.

Even the oil and lead system favored by old time painters, as well as a great number of latter day painters, is being adjusted to meet modern conditions, and instead of the many days necessary to dry the oil and lead coats, the combination is doing quite the same work as of old in even less than two-thirds the time formerly required.

The same good measure of lead is used in combination with a diminished quantity of raw linseed oil, and by a careful and judicious employment of turpentine the resulting pigment contains all the necessary elasticity, necessary prompt drying properties and that fine, dense, compact texture invariably characteristic of white lead.

The primer made up in a manner to suit the individual requirements to which the material is applied, and the lead coat following next upon the primer, will naturally need the greatest amount of time in which to dry, and it is never advisable to force these coats, except by subjecting them to exceedingly warm, dry air. For a metal surface or for a surface of hard, close grained wood, the primer carrying two-thirds raw linseed oil and one-third turpentine, with perhaps twenty drops of coach japan to each pint of liquid, will dry in 36 hours under proper drying conditions.

Probably a system of painting and finishing the car that is reaching well into popular favor at this time is the "hot air" drying method.

Hot Air Drying System Is Getting Popular

Briefly, this system comprehends carrying the various processes through at an average of 100 degrees or 110 degrees. At these or intervening temperatures the priming, painting, coloring, and varnishing may be performed with the ordinary materials supplied for such work. For any temperature in excess of 110 degrees only paints, and enamels, and varnishes, specially made for oven baking work are suitable. Normal air drying colors and varnishes at a higher temperature than 110 degrees lose in luster, brilliancy and tone. By the use of the hot air method work from the bare metal or wood can be painted and finished in anywhere from 7 to 12 days according to the grade required.

The day of hot air and oven baking methods of painting and finishing the automobile, accomplished through the medium of large ovens is fast approaching, if not already here.

Making Sheet Rubber

A Picture Story Told Chronologically of Making Sheet Rubber Used for Inner Tubes and Tire Casings for Use on Passenger and Commercial Automobiles

Illustrated from Photographs Specially Taken for THE AUTOMOBILE

IN this and the following pages two aspects of tire manufacture are illustrated by photographs specially taken in the Ohio tire factories, the process illustrated in each being described beneath. Aspect No. 1 covers the manufacture from crude rubber of the sheet stock used in the manufacture of tubes and casings. Sixteen illustrations arranged consecutively take the reader step by step from the rubber biscuit to the finished product.

Aspect No. 2 shows the manufacture of inner tubes from the rubber stock as produced in the first part. Six illustrations, all reproduced from actual photographs, explain this process.

Aspect No. 3 of tire manufacture, which deals with the making of the casing, will be dealt with in a similar pictorial manner in a succeeding issue of THE AUTOMOBILE. *In this, seventeen photographic reproductions with explanatory notes will tell in step-by-step fashion how casings are manufactured.*

By means of this graphic method of telling the story the reader who has not had an opportunity of visiting a rubber factory will be able in a few minutes to gain a good general conception of the various processes that the tire goes through in the factory. He will be shown the automatic tiremaking machine now being used in one of the factories. He will be shown the manufacture of the tire bead and how it is inserted in the casing. He will see the various vulcanizing methods. He will see inner tubes developed from sheet rubber to the endless finished product.

Fig. 1—Seven varieties of crude rubber in biscuits as it looks when received at the rubber factories. It comes in a number of different forms, dependent upon the locality in which it was produced. There are also various grades of the product, some of which are much finer than others. Wild rubber contains much more foreign matter than does the cultivated plantation variety, due to differences in methods of gathering. The factories receive shipments from South America, Ceylon, Mexico and other points. The samples here shown were taken from shipments at the Goodyear factory, Akron. The trade names of these grades are: 1—Ceylon Crepe; 2—Manihot Biscuits; 3—Soudan; 4—Fine Para; 5—Ceylon Biscuits and Sheets; 6—Cameroon; 7—Massai Strings

Fig. 2—The first step in the actual preparation of the crude rubber for working into rubber stock. This shows a corner of the washroom at the Goodrich plant where the crude rubber is cut up into small pieces, placed in vats containing warm water and allowed to soak so as to soften it sufficiently that it may be broken down in the machines. Some grades of rubber are so stiff that if they were put into the cracking rolls and washing machinery before they were softened they would probably damage the machinery

The action of the water which is of such a temperature that it may be called medium hot, is such that the rubber is softened through very much the same consistency as the rubber which is found in inner-tubes. The leathery stiffness which could damage the washing machinery is then removed

Fig. 3—After the rubber has been allowed to soften sufficiently, it is put into a cracker, a machine consisting of two heavy rolls, as shown, which have on their surfaces projections in the shape of pyramids. These rolls are made so as to be adjustable and one revolves considerably faster than the other. This action effectively breaks down the crude stock into a spongy mass. As it is being worked, water flows on to the rubber and washes out dirt, such as sand, gravel, bark, or any other foreign material which comes mixed with the crude stock. It is put through the machine several times until it is clean and in uniform condition. The illustration shows the operation being performed in the Swinehart plant

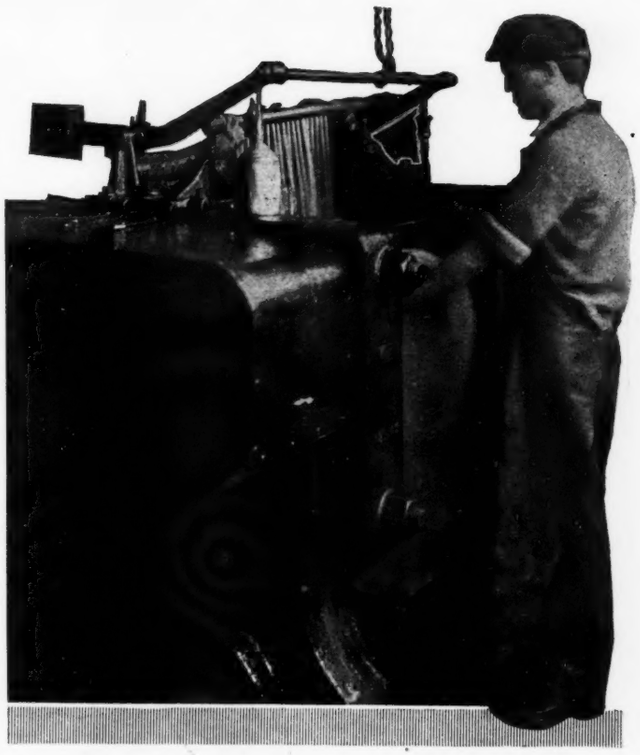


Fig. 4—A rubber washing machine in the Goodyear factory. In machines of this type the rubber undergoes the third process in its manufacture into pure stock. The process is very similar to that performed in the cracker, the machine having two large rolls revolving at different speeds. But instead of having pyramid projections, the surfaces of these rolls are grooved, and are therefore less severe on the rubber. As the rolls run very close together, the rubber is rolled into comparatively thin sheets, water playing over them continually to wash out any dirt which remained after the previous operation. There are a great many of these machines in the Goodyear plant. They form a regular battery

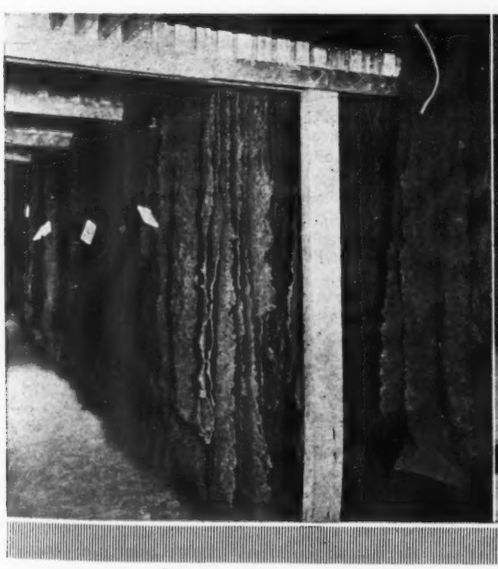
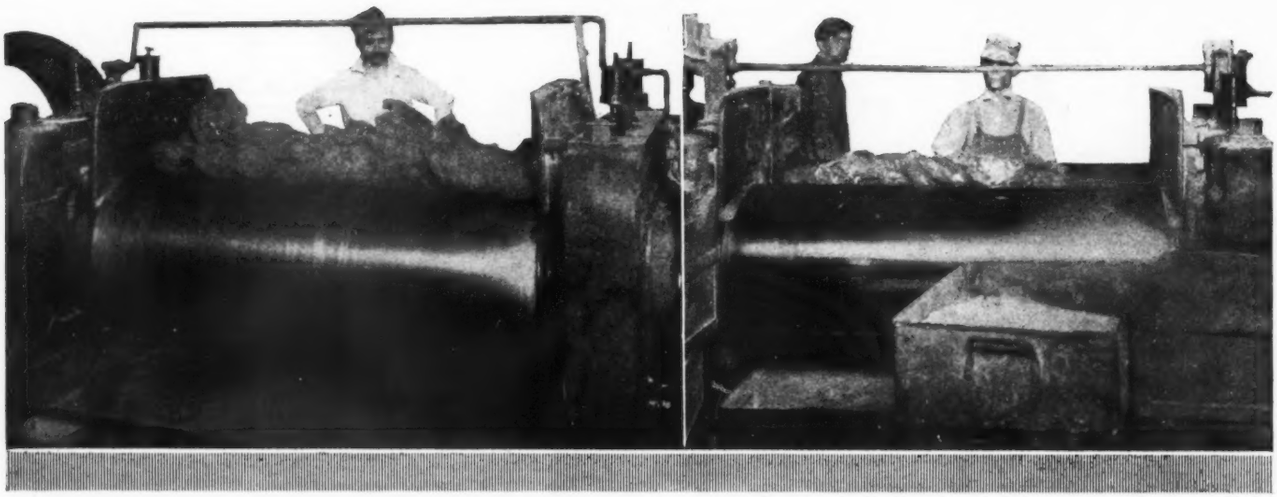


Fig. 5—After the rubber has been washed, it must be thoroughly dried before it can proceed further in its manufacture, as any moisture in it would turn to steam and form blisters when vulcanized. There are two ways of drying. The long washed sheets of the better grades of rubber are hung on poles in a drying room, as shown above. The view was taken in the drying room of the Republic company, Youngstown, O.

Fig. 6—Certain low grades of rubber which contain a large amount of resin will not hold up their own weight when hung over poles in a drying room, but fall to the floor in piles. Obviously, some other method of drying has to be devised for these grades, and the vacuum drier is resorted to. As shown above, this consists of a number of shelves within a large oven on which trays of the washed rubber are put. The air is next exhausted from the drier and the interior heated by steam. Such rubber is not used in rubber tires. Illustration shows the vacuum drier at Republic plant, Youngstown, O.



Figs. 7 and 8—Having been dried sufficiently, the rubber is now ready to be mixed with whatever chemicals are necessary to give it the desired properties for the purpose intended. After a batch of the dried stock has been weighed out proportionate to the amount of chemicals to be added, which are in the form of dry powders, the whole goes to the mill room, where there are a number of machines of the type shown above. The left-hand illustration is from a photograph taken at the Firestone factory, and the other shows one of the mills at the Swinehart works, Akron, an idea of the size of the machine being given by the comparative height of the workmen.

These mills have two large rolls each, which have smooth surfaces and run very closely together. They are provided with hot and cold water connections to their interiors so that they may be heated to any desired temperature. The rubber is first thrown into the mill and literally kneaded and warmed up until it becomes very soft and plastic. It passes through the mill time and time again until it has become a uniform, sticky mass.

This preliminary process over, the chemical ingredients are thrown on, usually a small quantity at a time, as fast as the rubber will take it up. In the foreground of one of the above views are shown some of the trays containing the chemical powders. The mixing goes on until the chemicals have been uniformly spread throughout the mass by passing again and again through the rolls. To obtain rubber of different colors various coloring chemicals are added

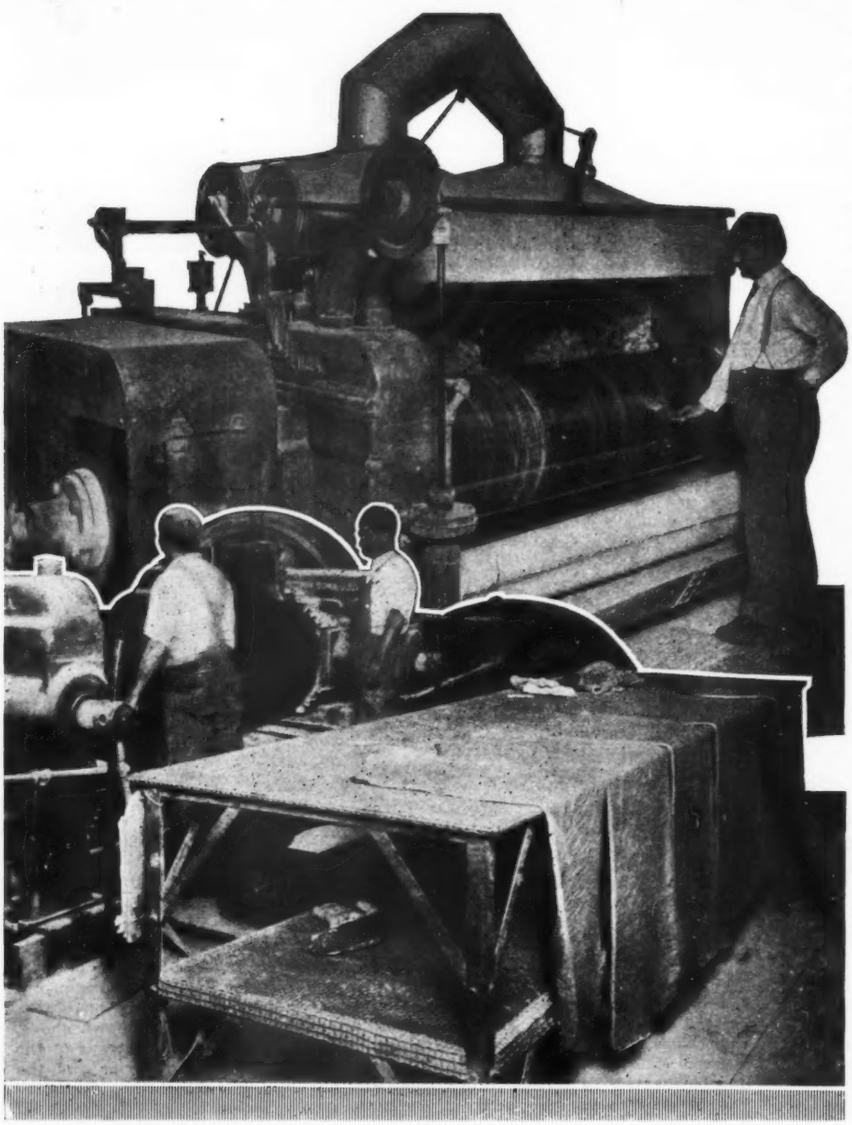


Fig. 9—The special form of mixer used in the Firestone factory, Akron. These machines are similar to the ordinary mixing rolls in every respect, except that they are provided with mechanical mixing pans. The chemicals are placed in the pan below the rolls and, when desired, this may be raised over the rolls, throwing the ingredients on to the rolls. This method of applying the chemicals is particularly desirable in the case of those which give out obnoxious or injurious odors. A screen may be let down over the front of the machine, while ventilators above carry away the odors, thus protecting the operator

Fig. 10—When the rubber has been properly combined with the necessary chemicals, it is cut off the rolls in large sheets as seen here. This is the green rubber stock which is rolled up and stored long enough in stock rooms to be properly seasoned, after which it goes to that particular department of the factory in which it is to be used. The photograph was taken in the Republic factory, Youngstown, O.

The rubber sheets are stored while seasoning in a cool, dark room. It is a well-known fact that sunlight and heat are enemies of rubber and if they were allowed to be subject to the action of either it would deteriorate rapidly.

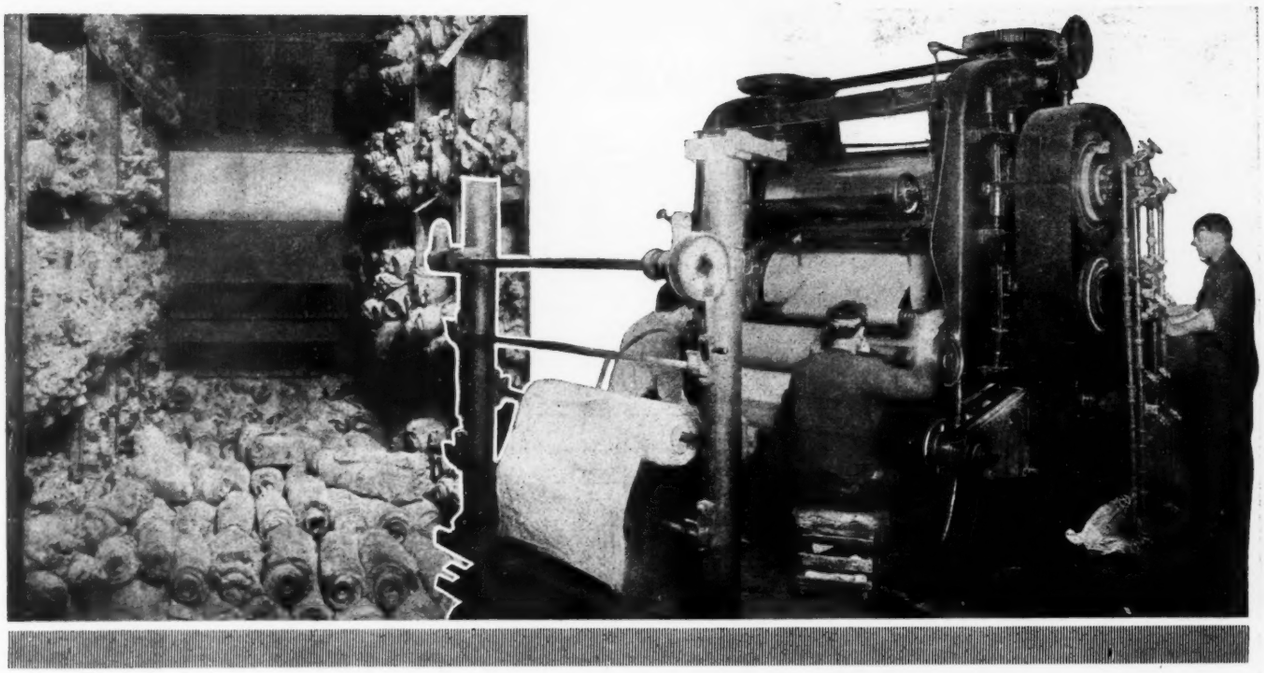


Fig. 11—View in the uncured gum stock room of the Firestone plant, Akron. The mixed green-stock has been rolled up as shown after being coated with soapstone to prevent sticking. Variously mixed stock is placed in the different bins to be seasoned, after which it is sent to the calender room to be sheeted out or forced into fabric for use in the making of pneumatic tires and other goods requiring sheet stock; or to the solid tire department, where it is forced through dies and thus molded into the form of tires or other solid rubber goods

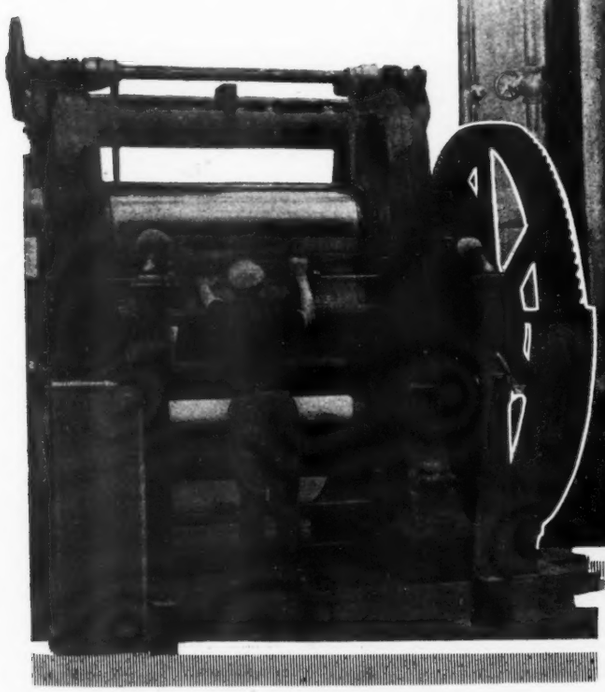


Fig. 12—Coming from the green-stock room, the mixed gum is passing through the heated rolls of the calenders. The above view shows this operation as performed at the Goodrich factory, Akron. The rolls are adjustable so that any desired thickness of stock may be rolled

Fig. 13—This calender is rolling out very thin inner tube stock which is being put between the rolls from the other side. Knives on either side of the roll may be adjusted so as to cut the stock at the required width. At the right the illustration gives some idea of the method of piping the hot and cold water within the rolls so as to keep them at the desired temperature. View taken in the factory of the Firestone company at Akron

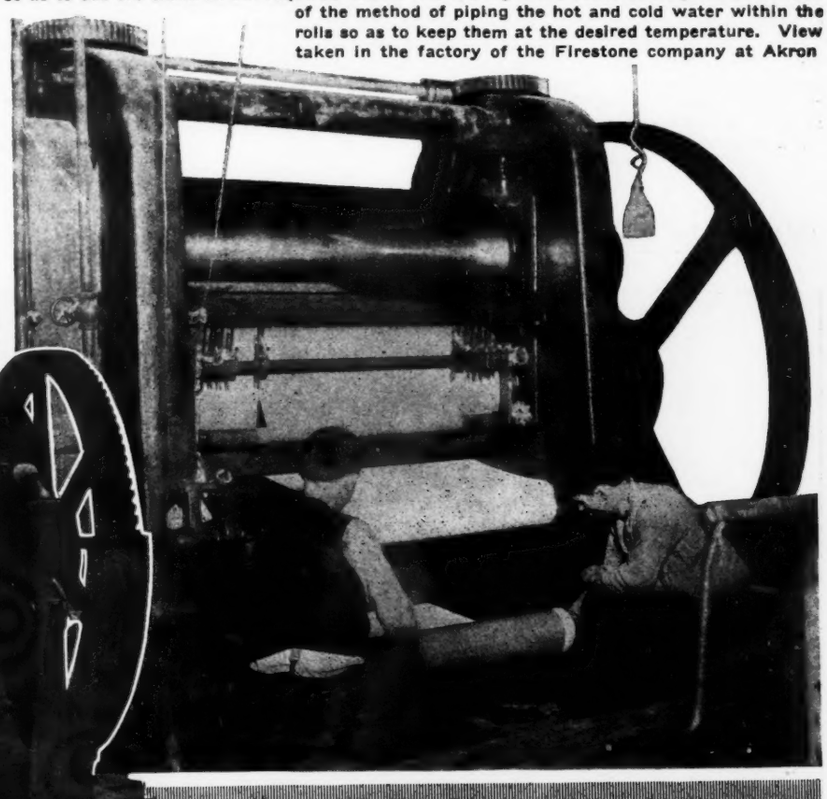


Fig. 14—Another view showing the calendering of thin stock for tire purposes. This illustration also brings out clearly the method of winding the long gum sheet in a cloth liner so that it can be easily transferred to the various works departments to be subsequently passed through. The cloth unwinds from a spool around the lower roll of the calender, between it and the rubber stock, which also passes around this lower roll. The rubber and cloth both wind up on the spool at the bottom. This photograph also shows the arrangement of adjustable cutters by which the sheet is cut to any desired width. The above is a large calender machine in the Swinehart company plant

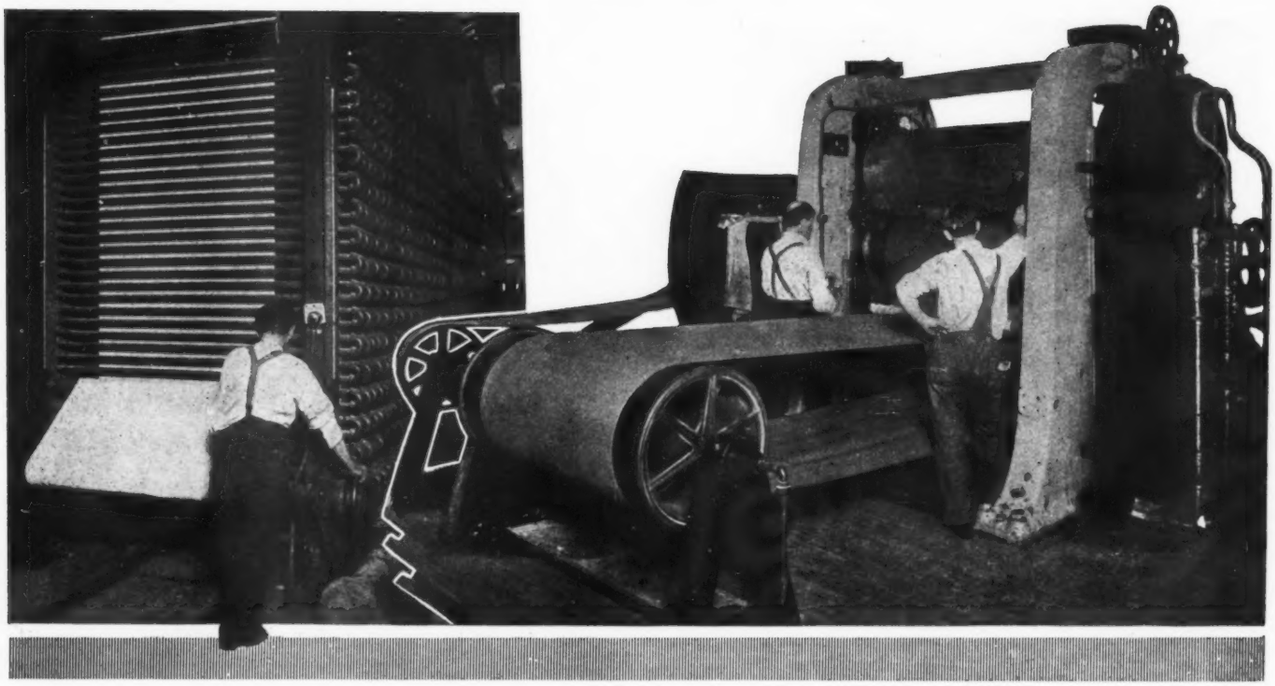


Fig. 15—The rubberized fabric which is used in the making of tires and for various other purposes, such as waterproof clothing, etc., must be perfectly dry before the rubber is applied to it. The view above is that of the fabric drying machine used in the Republic factory at Youngstown, O. It is made up of a long bank of steam coils over all of which the cloth passes so as to assure its freedom from moisture. The cloth unrolls at the opposite end and passes alternately up and down between each series of pipes, finally coming out at the end shown, where it is again wound up and ready for calendering

Fig. 16—After thoroughly drying the fabric by the method depicted in the previous illustration, it is carefully examined for any imperfection. If this inspection is satisfactory, the fabric is next subjected to the process known as frictioning in the machine shown above. By frictioning is meant the squeezing or grinding of the gum into the weave of the fabric. This is accomplished by placing the compounded rubber between the top and middle rolls, from where it passes around the middle roll and is then forced into the cloth as it passes between this and a lower roll. Scene in Republic works at Youngstown

Making the Inner Tube

Picture Story on How the Different Companies Do It

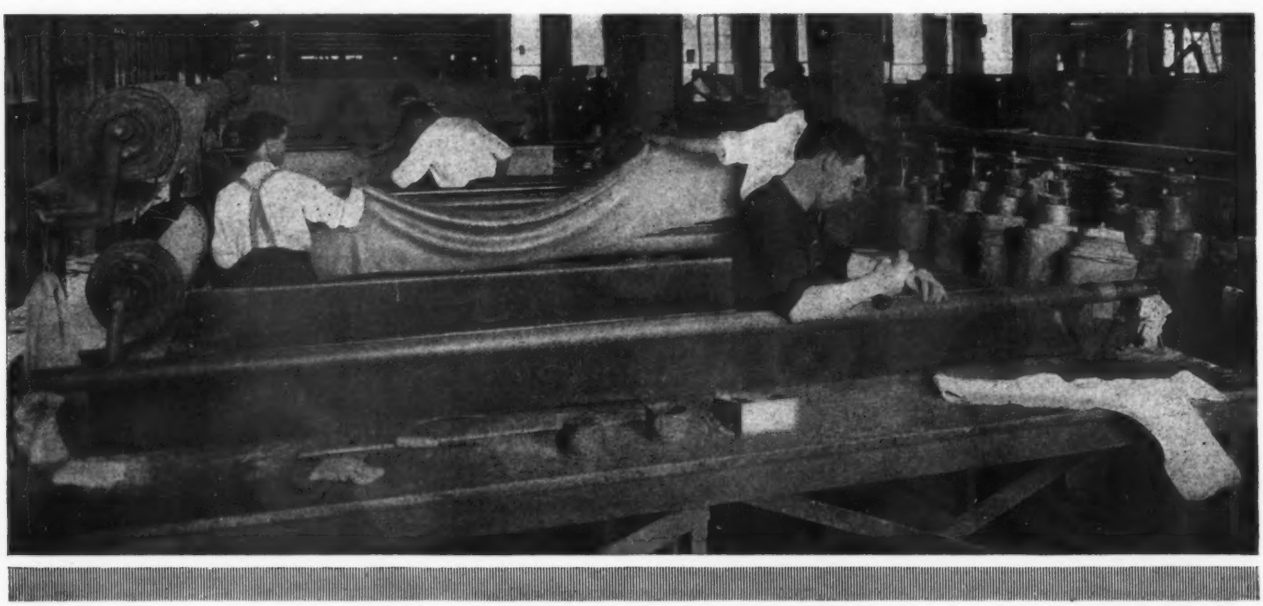


Fig. 1—Inner tubes are generaly made in one of three ways: First, by rolling thin, wide sheets of rubber over long mandrels so that there are several layers making up the desired tube thickness; second, by folding over strips of rubber and joining the long edges together with cement, the strips being just wide enough to make the proper cross sectional diameter of tube when inflated; and third, by the use of tube machines which force the gum through dies having solid centers, thus giving the tube form. The first two methods, giving the tubes the classifications of rolled or seamed tubes, respectively, are the most used.

The rolled tube process is illustrated above, which shows the rolling of wide sheets of thin rubber over the mandrels in the Goodrich plant. The various plies are rolled down smoothly with hand rollers until the entire sheet has been wound around the mandrel

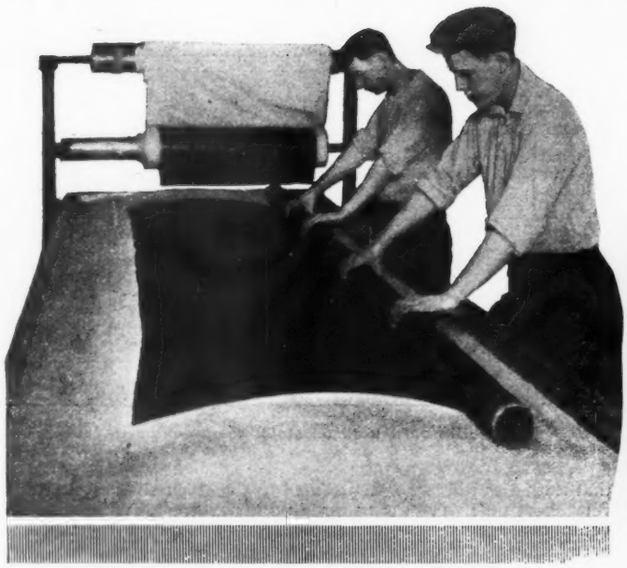


Fig. 2—Showing the method of rolling up the tubes in the Republic factory. The wide strips of thin stock are pulled out on to the table and cut off at the proper length after which they are rolled up around mandrels. The rolling table is really an air bag, so that in the rolling process all wrinkles are prevented

Fig. 3—The tubes which are made by the seamed process must also be placed on mandrels for curing. This is done by the use of compressed air, as seen above. The worker inserts the air connection in one end of the tube, while the other is held so that the air cannot escape. This expands the tube enough so that it will slip over the mandrel easily. View in the Goodyear plant

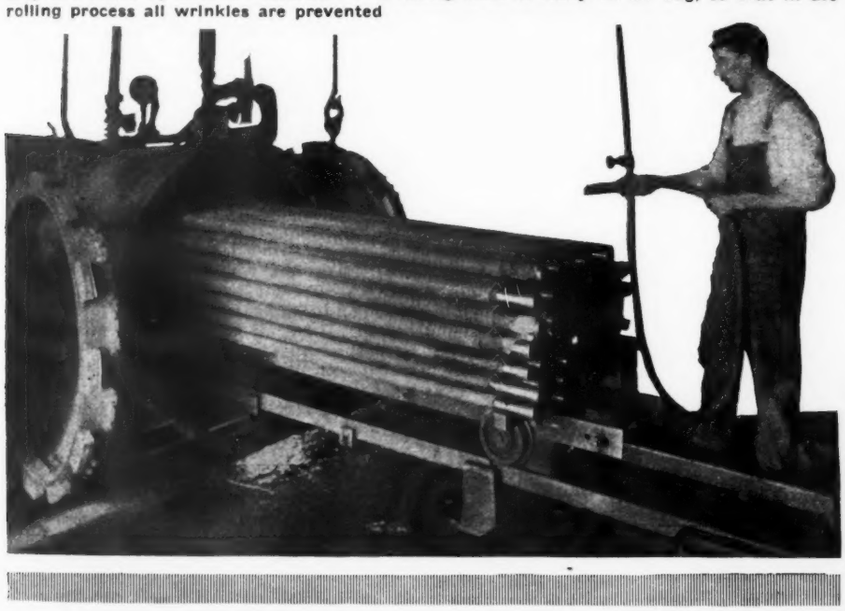


Fig. 4—After the tubes are on the mandrels, the curing process is the same regardless of how they were formed. To protect the rubber from the direct action of the steam during the vulcanization, wet cloths are wrapped around them. A number of the mandrels holding the tubes are next placed upon a carrier in the manner shown above and run into the large horizontal heater. After vulcanization, the cloth wrapping is removed and the tube stripped from the mandrel inside out, so that the smooth side which was next to the mandrel is outside and the rough surface which came in contact with the wrapping cloths is within. The photograph was taken in the Goodyear plant.

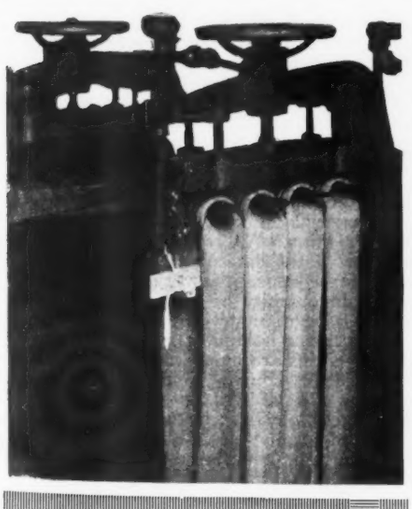


Fig. 5—The splicing operation in a tube is a very simple one and consists essentially of slipping one open end over the other for about 2.5 inches, cement being applied to the lap. This cement contains an acid which cures the rubber chemically and eliminates the use of heat for the purpose. The illustration to the left, taken at the Republic works, shows a method of acid-curing these ends together by the use of multiple presses, the ends being placed within the forms which insure an even pressure being exerted all around the seams when the presses are applied. The vulcanization of the ends takes about 20 minutes. The end joining process completed, it is only necessary to test the tubes in water for leaks, after which they are prepared for shipment

Fig. 6—The cured tubes are next punched for the valve stems; these are inserted and the ends of the tubes are beveled or buffed down so that they will join together without making a ridge. The view below in the Goodrich factory shows a number of vulcanized tubes ready for the end splicing

Simplified Stock System

With Five Forms, the Entire Storeroom and All Its Requirements Are Served in a Satisfactory Manner

THE handling of material in a service department for factory branch where large quantities of stock must be taken care of, stored and disposed on repair jobs or sales is a complicated problem. Of course, everybody has some way of coping with it; but there is a difference between a system and an efficient system. The former indeed serves to prevent errors and losses and consequently may serve its purpose although at the expense of considerable work and trouble to everybody concerned; whereas the latter does away with this trouble and makes errors absolutely impossible provided the simple and fundamental rules of the system are adhered to and carried out.

The system necessary for the efficient operation of a stock room consists in the use of simple, exact and comprehensive records of all essential data and the services of men capable of handling these records in addition to the routine work of taking care of the materials stored in the stock room. It is considered good practice, so far as the second point is concerned, to select for the stock room superintendent a man who is a mechanic and consequently knows the various materials, their purposes and relative values; and it is this very knowledge which produces the probability of mistakes that are apt to follow if the stock room is in the care of a man who does not thoroughly understand the purpose and the requirements of that department. On the other hand, however, a mechanic, if he is a good one, is capable of earning more money at the bench, is freer with his time and need not worry about his work, which is not true of a stock room superintendent.

Stock Room Experience Needed

This fact detracts from the value of a mechanic as a superintendent and makes it difficult to hold him to his job for a long time. It is perhaps the best course to take in a man who has had experience in stock room work and at the same time with him keep a young man taken from school who will in a short while pick up the trade terms used for the various parts and in the course of time will become thoroughly familiar with all the details of the work in this department. This type of employee is quite apt to adopt stock room work for his vocation.

It is necessary, in order to get efficient service from a man, to make his work as interesting as possible, and the stock room system described below fills this condition probably as well as any system used today. It includes the use of five forms which are kept in separate files all except the bin card which is attached to each bin containing material.

In arranging a stock room the first thing to do is to place corelated parts near each other, for instance, rear axle assemblies should be placed near axle sections, differentials, brake drums, bevel gears, etc., the same thing applying to steering gear assemblies, ignition systems, etc. The heavier parts or assemblies should be placed in the lower bins while the latter parts ought to be stored above them. This method of arrangement, which has been introduced in a considerable number of stock rooms now in operation, has the advantage that any part is easy to find and

DIAGRAM NO. 1

DATE 6-1-12 REQUISITION ORDER FORM

Number Required	Symbol Number	Description of Article	Date Required	Number in Stock	Last Outside Ord. No.	Remarks
2,000	FN	½x2" Bright Hex. Steel Bolts.....	In 30 days	750	24,679	.....
100	BL	Stauffer Lubricators, No. 3.....	40 days	60	16,493	.....
150	AB	Windshields, Type B 462.....	40 days	35	24,321	.....
	Chief Storekeeper's Signature.....					

Fig. 1—Requisition order form

DIAGRAM NO. 3

RECEIPTS BIN					ISSUES O			CARD		
Date	No. Rec.	Price	Outs. Order No.	Sup.	Date	No. Iss.	Total in Stock	Date	No. Iss.	Total in Stock
10-9-12	2,000	4.15 gross	24,679	J.M. & Co.			2,000			
					12–9	50	1,950			
					12–9	25	1,925			
					30–10	40	1,885			
					2–10	500	1,385			
					1–1–13	380	1,005			
					5–1–13	255	750			
MINIMUM							200			

Fig. 2—Bin card used on stock room compartments

that a man can become accustomed to the stock room system in a very short time. The next thing to do is to prepare a standing inventory consisting of bin cards, one of which is attached to every bin in which material is stored. The bin card, Fig. 2, is 5 inches square and printed on both sides affording space for entering both the receipts and issues of material from that bin. Whenever any material is received the following data are entered on the card: the date, the number of parts received, the price per unit, dozen, hundred, gross or thousand, the number of the order sent to the company supplying the material and the name of that company. All these points referring to the receipts of parts are entered on the left hand half of the card. The issues of material are recorded on the right side of the card, consisting of the date, the number of parts issued and the number in stock after this material has been taken from it. It is not necessary to make a note of the requisition number because, as will be shown below, the requisitions are so filed that it is easy to refer from them to the bin cards. On the bottom of the card the minimum number of parts which should always be kept in stock is entered. Before this minimum number is reached the stock room foreman must see to it that an order is made out to replenish the stock. The minimum should never be reached in practice because of the possibilities that an order may not be filled promptly and the department might run out of stock which would impair the business of the company. For this purpose the foreman must take an inspection trip through the department once every week, covering one-sixth of it per day. This is easy work and takes little time but is most effective in preventing the running out of any of the stock. In case of a factory the minimum is to be fixed by the engineer or manager of the factory.

Requisitioning Material

Whenever material is required for the shop—the system may be used for a factory or service department—the requisition, Fig. 4, is filled out by the foreman of that department. This form comes in books and is 8 by 3.5 inches, printed on white paper with a copy blank on blue paper. In filling out the requisition, a carbon copy is made on the blue sheet after which the white copy is torn out of the book and turned over to the stock room to be filled. Before this happens, however, the foreman looks over the requisition handed to him to see who requires the material, checks the name, quantity and reference of the material required and sees whether the work for which this material is needed is mentioned on the order. In the case of Fig. 4, this is done at the bottom of the form, to the right of the signature of the foreman, written down to O. K. the requisition. After the material has been delivered by the stock room clerk the person receiving the parts signs the requisition to signify the receipt of the material and the stock-room clerk or foreman files away the requisition. All requisitions are filed by the stock room in the order of the date on which the materials have been issued and as a consequence it is very easy to find out on what requisition a certain quantity of material has been issued, as the date of every issue of material appears on the bin card attached to the compartment holding a given set of parts. To make reference easy these bins are numbered or marked with reference letters, which latter course is preferable, as, if combinations of three letters are used, 14,600 such combinations are available. The advantage is obvious; instead of writing five signs, only three are required at all times.

If any material, no matter what kind, is taken from the stock room temporarily for use in the shop, a special type of requisition, Fig. 5, is filled out. This form is known as a loan ticket. All tickets come in form of a book duly numbered. As the illustration shows each ticket consists of a section which may be

torn off along a perforation and of a loan counterfoil which remains in the book as a memorandum of the material lent to a worker whose name is recorded, together with the material on both the ticket and the counterfoil. The ticket is given with the material to the man who takes it out and if it is not returned in good order and within a reasonable time, the man who took it out is charged with the price of the material. This sort of form is valuable inasmuch as it insures prompt return of tools and other material lent to men.

Card File Is Superfluous

The introduction of this system makes the use of a card file corresponding to the bin cards superfluous and thereby saves considerable time, stationery, and the eternal work of checking the bin cards against the file cards. The foreman of any stock room will appreciate what this means as it takes practically all the time of one clerk to keep the bin and file cards properly corresponding. Aside from this it makes for complication and a higher stationery bill.

When the stock of any one material is running low, the stock room foreman fills out a requisition order Fig. 1 which he is to take to the head storekeeper—if the system is used in the factory—or to the superintendent—if it is used in a service department. The later O.Ks. the form, after which it is sent to the ordering department where a purchase order—not shown here—is made out and sent to the dealer supplying the material. On each requisition order form, as here shown, the date quantity of parts required, the symbol appearing on the bin cards, the description of the material, the date on which it is to be received and the number in stock at the time the order is made out are stated. There is also a note of the last order number on which the material now in stock was supplied. The purchase order which is sent out by the ordering department is a simple form of conventional design and therefore not illustrated.

The stockroom foreman should make a record of every requisition order which is sent through, and for this purpose the day book is used. The latter contains a note of each order sent to the ordering department, giving the date of the order, the symbols, nature and quantities of materials ordered. If the material is received, the quantity delivered and the date of receipt are made note of, as is the number of the order sent out to the dealer supplying the material. As soon as all of a material which was ordered has been delivered, the line is crossed out in the book by the foreman, with red ink. The arrangement of these records in a book and in order of the dates is also a sane and advantageous scheme, as it is easy to quickly go over all the records of outstanding orders and to see if they are properly coming in. If necessary, follow-up orders can be sent out, the attention of the ordering department being called to the need for them.

—

Gasoline vs. Electric Trucks

It has been the practice for some time past that the sellers of gasoline and electric trucks have been operating against each other, instead of together. In other words, the salesmen in each field have become accustomed to show that the class of product sold by them is once for all preferable to the other class. In order to prove the statements made, records of operation made with both classes of vehicles were brought to prove the truth of the claims made, and of course, this was apparently shown. But very frequently, the service given by the truck after did not come up to expectations. The reason for this phenomenon is that different vehicles are best for different fields.

In order to prove this, it is necessary only to remember that in such narrow streets as those of downtown New York, automobiles are practically barred. In all except one or two of the widest streets of the financial district even, automobiles are a rare sight. This is due to the narrowness of the streets, their often steep incline and the number of pedestrians which crowd the street pavement, making it impossible for automobiles to make headway safely. For this fact, automobiles are forced to adhere to such main avenues of traffic as Broadway, where speed can be developed on the force of a tradition making it an absolutely modern street. But on the lower West side, there are also few automobiles, except where many wholesale houses are grouped together and no living quarters around.

Requirements in Dense Traffic

The dense city traffic in Manhattan and the Bronx calls for facilities of very frequent and positive stopping at short range, and this must be done effectively as well as efficiently; the motor must not consume much fuel despite the irregularity of its operation. Unfortunately, motors do not always conform to this rule, and the momentum of a gasoline motor being relatively stronger than that of an electric motor—due to the self-braking effect of the latter when the field is dis-energized—gives the electric truck a considerable advantage over the gasoline vehicle in the city, especially for frequent stopping service, such as department store delivery. On this account, stores use electrics almost exclusively for city work, and large gasoline trucks for suburban deliveries or transfer work.

It is in the latter field that the gasoline freight automobile is absolute ruler, as the very supremacy of its radius of action puts it above the electric truck in respect of usefulness. If permitted to go at its rated speed, the gasoline truck, especially if of a capacity of more than 2 tons, seems to have a great advantage over the electric, or it would not be used for just this service by firms who have satisfactory city experience with small electrics. Of course, where such heavy loads have to be transported as in the coal, brewery and contracting business, the reign of the gasoline truck is practically undisputed and will probably remain so for some time to come, although improvements in the electrics may make them available.

Supplied in book form and carbon copy to be retained by the shop requiring the material, the original being handed to stores, who fill in same and pass to cost department.

DIAGRAM NO. 4

DATE 10-1-'13 STOCK REQUISITION FORM No. 240,163

No.	Symbol No.	Name of Article	Price		Total	Value
50	J. T.	Front Spring Bumpers	25c ea.			

Foreman's signature...J. S. B. Works order or Assembly No. 2170

A similar form can be used for returning material to stock, but must be of a different color. Buff for credits and green for debits being suitable. Works Order No. would perhaps be more convenient in another position.

Fig. 3—Stock requisition for drawing materials

DIAGRAM NO. 2

DAY BOOK

Date	No. Ordered	Description	Symbol No.	Number Rec'd	Outside Ord. No.
6-12	2,000	¾x2 Brt. Hex. Stl. Bolts.....	FN		
	100	Stauffer Lubricators No. 3....	BL		
	150	Windshields Type B 462.....	AB		

Fig. 4—Page from stock room foreman's daybook

Supplied in book form and the counterfoil is retained by stores, the storekeeper filling in date when returned, and destroying the original ticket (more often than not the workman borrowing loses his ticket), but an endeavor should be made to get the men to return ticket with the goods, as it greatly expedites the service.

DIAGRAM NO. 5

LOAN COUNTERFOIL	LOAN TICKET
Date.....	Borrowed from stores:
Loaned to J. Andrews:	1 Generator 1 Tool Kit
1 Generator 1 Tool Kit No. 200	Supplied by..... *Stockkeeper*
Signed..*J. Andrews*..	To J. Andrews. Check No. 200
Received back in good condition.....	
Stockkeeper.....	All workmen borrowing from stores are responsible for whatever goods they take and if not returned in a reasonable time in good condition, will be charged up with the value of such goods.
Date.....	

This system of dealing with material loaned will be found to be very efficient and easy to work. The storesmen being made to understand the vital importance of not releasing anything to anyone without a loan ticket.

Fig. 5—Loan ticket used for temporary stock issues

The Rostrum

In which Letters from Readers Are Answered and Discussed

Gearbox Location Discussion Continues—Explanation Given on Induction and Transformer Coils—Kerosene Used Through Intake Manifold—Grease Cups Choke with Dirt—Gray & Davis System Explained

Gearbox on Rear Axle Gives Owner Trouble

EDITOR THE AUTOMOBILE: I see through your columns that you desire opinions from users in regard to the location of transmission. The writer has driven several makes of machines during the last 6 years, two of which had the gearbox on the rear axle. In addition to this, the writer has had considerable opportunity to observe transmissions in the repair shop. I want to go on record as being one qualified in favor of the amidship location for all sizes, prices and weight of cars.

The transmission on the rear axle undoubtedly gives the most trouble, particularly, the housing. No unit is stronger than its housing, and I have had the housing break off of the rear system of one of my cars three times. Once, the torsion tube snapped off just ahead of the housing; once the flange of the housing cracked off where it was joined to the rear axle, and once the whole housing was cracked from hitting a rock on a very uneven road, all caused by the great weight and extreme vibration. I have seen similar experiences on other machines in the shop.

The transmission is one of the most vital parts of a machine and the tremendous vibration from the rear axle certainly does no part any good. I have seen several instances where the lock nuts on the bearings were jarred loose allowing the ball races to tighten up and unwind, and practically ruin the entire system. The best systems of this kind are very hard to get to and adjust, and a number of makes are almost impossible. I have seen 15 to 20 hours' work put in on a rear system of this kind for minor adjustments that could have been made—had the transmission been amidship—in less than an hour's time.

These disadvantages are in addition to the fact that the excessive weight produces hard riding and undue wear on the tires.

The unit transmission is very objectionable owing to its inaccessibility. Practically the whole engine has to be torn down in order to get to the clutch. I call to mind a recent experience in which it was necessary to replace several plates in the multiple-disc clutch in which the whole engine had to be taken from the frame and the whole transmission torn out piece by piece in order to replace them, all of which took over 30 hours. It should have been done in less than an hour, had the clutch been located in an accessible position.

Another point to bear in mind is that when a minor repair requires so much tearing down and putting back, there is always the risk of a poor mechanic reassembling or adjusting the various parts necessary to be removed not as well as they were at first. Whenever any part is in perfect shape it is always a bad thing to disturb it, and often disturbing perfect running parts in order to make minor adjustments on other parts leads to a sequence of misfortunes which causes large repair bills.

The amidship location, when directly under the foot-boards, as usual, is most accessible. By removing one cover plate all parts of the transmission are exposed and easy to get at, and in case of clutch or rear axle trouble it is not necessary to trouble or disturb the transmission at all.

Furthermore, in this position it is free from the vibration of both the engine and the rear axle. It is in a much more protected position and is more liable to stay right. It may be possible to build the unit a little cheaper in connection with either the engine or the rear axis, but the user is bound to pay the entire difference on his repair bills.

St. Louis, Mo. C. V. B.

¶ *In answering this question car owners are directed to the fact that one of the leading arguments advanced against rear axle location is that of increased axle weight and consequent tire damage. Definite information on this line would be in order.*

¶ *Those not in favor of the amidship location have urged against it lack of accessibility.*

¶ *The gearbox as a unit with the motor has been criticised in that it is not suitable for a heavyweight car because of the fact that too much weight is placed in front.*

Gives Information on Electrical Apparatus

Editor THE AUTOMOBILE:—In the Rostrum of THE AUTOMOBILE for June 5 where you give advice to E. Hughs of Scarsdale, N. Y., about a make-and-break ignition system, I wish to observe that the coil used in a make-and-break system is a plain induction coil and not a transformer coil such as is used in the jump spark ignition of an automobile. The coil used in the make-and-break has only a single winding and this winding is in series with the battery and the sparking points. (This system is identical with an electric cigar lighter.)

The system on which the make-and-break system works is as follows: When the sparking points come together within the combustion chamber of the engine it closes the electric circuit and as the coil is in series with the batteries the circuit is closed and the current travels from batteries through the coil and across the igniting points within the cylinder and back to the batteries. This now saturates the core of the coil with lines of force, (magnetic flux) and at the instant that the mechanical device of whatever kind separates the points within the combustion space the battery circuit is opened and the battery current ceases to flow but at the same instant this circuit is broken the line of force (magnetic flux) that is stored up within the core of the coil induces an entire new current within the winding and makes a heavy, fat spark many times fatter than is produced with the jump spark at a spark-plug. This is an ideal

system for an engine that does not run faster than about 500 revolutions per minute as there is no high voltage to keep up insulation on as in the jump-spark system any kind of low-tension wire is suitable and the system is free from tremblers and adjustments of all kinds except to keep the points adjusted as they wear away so they make a good contact.

It will easily be practical for Mr. Hughes to use his 28-volt storage battery to start his engines with and afterward switch over to the magneto. He can use a three-point switch and bring out a wire for the center of his battery, thereby using half of the battery to start with and when ready to start the next time throw the switch over to the opposite side and start with the other half, thereby keeping from discharging part of the battery lower than the opposite half. In either case, however, he will have to use a coil as the coil will give much heavier spark than the battery and not short-circuit the battery when the points are together. Besides, there is no chance for the current to arc at the points.

He could easily use the whole 28 volts by winding a simple coil to suit such conditions. Such a coil could be easily made as follows. Take a piece of Norway or Swedish iron about 1 inch in diameter and fasten a piece of wood about 0.5 inch thick at each end so as to form a spool and insulate the iron core by using two or three layers of tape and winding about thirty-five or forty layers of No. 24 cotton-covered magnet wire. Such a coil will easily handle the 28 volts and will use about 0.75 ampere at 28 volts.

This coil should be about 14 inches long.

I also note in the same issue of coil trouble with C. E. M. of Farmington, Conn. While I am not familiar with the Splitdorf model N coil and magneto but it is evident that part of the secondary winding of the coil is broken down and the reason that this coil will operate on the batteries and not with the magneto, (providing the magneto is delivering current properly) is that the batteries will give out a heavier current than the magneto and thereby still able to make a spark with part of the high-tension winding gone.

This coil and magneto might be an old model before the makers got to using a safety-gap in the high-tension side. If such is the case this winding could have been broken down by having the point at the plugs too far apart, causing too high a voltage to jump the gap or else started the motor with one or more of the wires disconnected from the plugs. It is bad policy to remove a wire from a spark-plug or the high-tension wire from the distributer while the motor is running or even cranking it with these wires disconnected unless you know your high-tension system is protected with a safety gap, either mounted within the magneto or on the coil. If there is no safety gap and by having the points too far apart or any of the high-tension wires disconnected when running, or even cranking the motor, it is highly dangerous to the winding of the coil, as electricity like all things in nature, takes the path of least resistance. Thus, when the wires are disconnected and the high voltage has to go somewhere, it is pretty near certain that the current will jump through the winding of the coil, thereby ruining it. With a safety gap this danger is almost entirely eliminated.

Woodsfield, O. J. K. MERCER.

Wants Muffler on Racing Exhaust

Editor THE AUTOMOBILE:—I own a 1912 Chalmers roadster model 9, 30-horsepower, that I am converting into a speedster. I wish to replace the present exhaust manifold with four exhaust pipes coming straight out through four openings in the left side of the hood, and at the same time I wish to retain some form of muffler for use in the city limits.

Will you kindly inform me how this can be done and furnish me with drawing of same?

Augusta, Ga. J. RUCKER HULL.

—You will not be able to fit a muffler if you let the exhaust pipes come straight through the hood. It will be possible, however, to fit a racing exhaust and at the same time use a muffler. Instead of breaking the pipes off short after they come through the bonnet, the exhaust is carried back in an easy curve as shown in Fig. 1. This will give a line with no back pressure and in fact will be better in many ways than the broken-off type of exhaust. The pipe terminates in a T-joint. In this T, the pipe enters at one side of the top of the T and when the exhaust is free it passes directly through the other side. The muffler passage is on the leg of the T and when the muffler is not in use a flap passes across the entrance to the muffler. When it is desired to use the muffler this flap swings through an angle of 90 degrees and blocks the exit forcing the exhaust to go through the muffler as shown in the illustration.

Pressure on Exhaust Valve Head

Editor THE AUTOMOBILE:—Will you kindly give me a formula for figuring the pressure on the exhaust valve at the moment of opening?

Springfield, O. P. A. S.

—The total pressure on the valve head at any time will be equal to the area of the valve head multiplied by the pressure in pounds per square inch within the cylinder. Since the area of the valve head is readily known by direct measurement of the

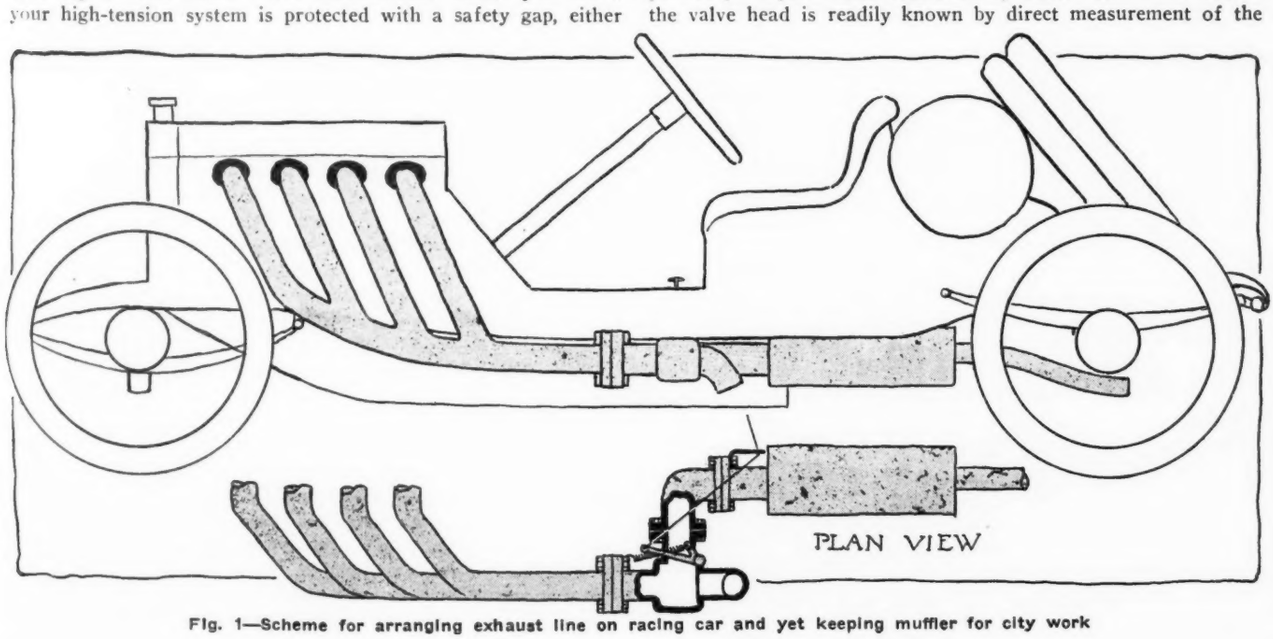


Fig. 1—Scheme for arranging exhaust line on racing car and yet keeping muffler for city work

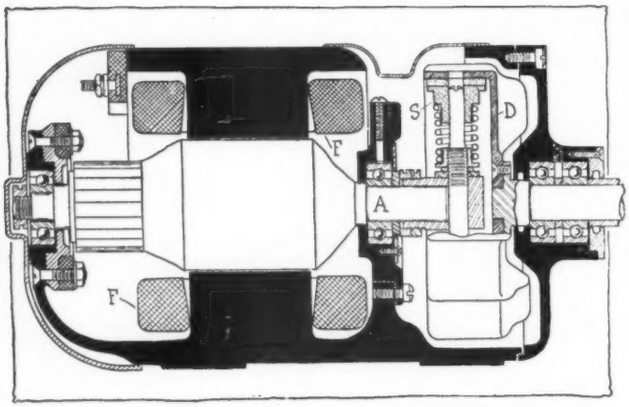


Fig. 2—Section through the Gray and Davis generator

valve diameter, it remains to calculate the pressure within the cylinder at any point in the stroke. The only suitable method of doing this work is to take an indicator or manograph diagram. For all practical purposes, however, it may be stated that the terminal pressure, Pt, on automobile motors is taken empirically by conservative authorities to be 6.5 atmospheres. It must be remembered that the highest must be taken and the terminal pressure will vary with every setting of the spark or throttle opening; 6.5 atmospheres is safe enough. The formula then is simply

$$P_e = P_t A_v \text{ or,}$$

exhaust pressure equals terminal pressure times valve area. In figures on a valve having a diameter D, the pressure at exhaust opening is calculated as being about 90 D pounds.

Wants Gray and Davis Explained

Editor THE AUTOMOBILE:—I have a Chalmers Six equipped with Gray & Davis lighting system and inasmuch as I do much of the up-keep work on my own car I must know something about the lighting system in order to give it intelligent care. I have the instructions from the Gray & Davis people but I find they are very meager. Among other things I am told that under certain circumstances the battery should be recharged. Why should this be necessary as long as the dynamo is performing properly and the lights are not on from the battery sufficiently long to discharge it? I do not run the car probably more than 75 miles per week, and of that probably not more than 10 per cent. would be with the lights drawn from the battery. During the balance of the time is not the dynamo charging the battery, and what loss is there while the car is standing?

2—I have a private lighting plant of 110 volts direct current, and in case it becomes necessary to charge the battery will you kindly tell me what installation is necessary to accomplish it, and, if you can conveniently do so, give me a sketch of the necessary wiring for this purpose?

Killian, S. C. THOS. F. DAVIS.

—The Gray & Davis system is easy to understand and from the following explanation you should know exactly what the duties of each component part of the system are. If you are simply using the lighting system, and have not the starting motor fitted, the description is the same except for omission of the parts relating to starting. The only care necessary is to keep the battery filled with distilled water except when you are storing the car. If the battery is to be kept out of use for a long period write to the makers for instructions, as each battery requires different care under these circumstances.

The description follows:

The Gray & Davis electric lighting and cranking system belongs to the three-unit class. Two units are furnished by the company, namely, an electric generator and a cranking motor. The third, or ignition unit, is optional with the purchaser and is not supplied by this company.

Both the electric generator and the motor of this system operate at 6 volts. A 6-volt battery is therefore used with this system, its capacity varying with the size of the motor which has to be started and the number of lamps used.

The generator is driven either through gears or by means of a silent chain. The speed of the generator is regulated by means of a centrifugal governor. This governor permits the generator to be driven positively up to 750 revolutions per minute in the case of one size of generator and 1,000 revolutions per minute in the case of another. Above these definite speeds the governor causes the driving clutch to slip, thus maintaining the armature speed very nearly constant.

These critical speeds are reached at a low car speed, so that the generator gives its full output when the car is traveling from 10 to 15 miles per hour, this variation being determined by the gear ratio and size of tires on any machine. The generators are geared 2:1 or 1.5:1 depending on the size used. They are driven either by silent chains or gears.

The regulation of the amperes output is accomplished in two ways on the Gray & Davis generator. The machine is compound-wound, namely, with a shunt field, SHF, and a series field, SEF, Fig. 2. Unlike most compound-wound machines used for electric lighting, the two field windings assist one another instead of oppose. For this reason this is called by the electrical engineer a cumulative compound instead of differential compound machine.

The regulation of maximum output is effected by the centrifugal governor, which keeps the speed of the machine constant. For that reason this may be placed in the class of mechanically regulated machines.

The purpose of the additional field, SEF, is to increase the output of the generator as the lights are turned on, without increasing the speed of the generator. For example, with all lights out, the generator will deliver about 6 amperes, while with all the lights burning it will develop 12 amperes. In between these two points it will deliver additional amperes in proportion to the candlepower of the lamps burning, that is, with half the total candlepower, 9 instead of 12 amperes will be the output.

An over-running clutch is always applied to the train of gears in the Gray & Davis system in order to prevent the gasoline motor from driving the cranking motor when the former starts up.

A starter switch connects the battery with the motor when cranking. This circuit is separate from the lighting and is direct from the battery to the motor.

A circuit independent from the lighting is used for the starter. Wires connect direct from battery to motor and are of No. 0 size in most installations, although in some No. 000 has been used to insure maximum efficiency. The starting switch, SS, is placed in this line. This switch is interconnected with the cranking gear train so that when the starting gear is shifted into mesh with the flywheel gear the current will be turned on.

The starting switch has two points; the first permits only a small current to flow to the motor, while the second allows the full battery current to rush through the motor. The first condition is obtained by imposing resistance in the line. Its purpose is to permit easy meshing of the gears without throwing on full power before the gears are meshed their full width. This is the usual practice with all types of flywheel geared starter switches.

This is the only machine with mechanical regulation which provides for an additional regulation in proportion to the output of the generator, Fig. 3.

The two generators which Gray & Davis make both have the distance from the base to the center of the armature the same, namely, 2.68 inches. In over-all length one of the machines is 12.11 inches long, the other 11.34 inches. In over-all width they are both 5.5 inches. The larger one weighs 32 pounds and the smaller one 25 pounds.

For cranking, two electric motors are provided by Gray & Davis. One weighing 38 pounds and capable of cranking motors

up to 36 horsepower and the other weighing 66 pounds and suitable for 75-horsepower motors. In both cases these motors are designed for a working speed of 1,500 revolutions per minute using 6-volt current. Both motors are cylindrical, one 8 inches in diameter, the other 6.63 inches.

The gear ratio used between the motor and the crankshaft naturally varies with the size of the motor to be cranked. It varies from fifteen to one in the case of a small motor to twenty to one in the case of a large motor. Assuming a cranking motor speed of 1,500 revolutions per minute the gasoline motor will turn over at the rate of 100 revolutions per minute with the first gear ratio and 75 revolutions per minute with the second ratio.

The current drawn in each case will vary with the size of the motor, the temperature conditions existing at the time of starting, the speed at which the motor is rotated and the condition of the battery. These are fundamental considerations and must be taken into account whenever comparing starters.

The Gray & Davis cranking motor takes current at the rate of 80 to 120 amperes under normal conditions. These are only relative values and not specific.

On account of the comparatively large reduction between the cranking motor and the crankshaft it is particularly convenient to apply the power from the Gray & Davis cranking motor through a train of reduction gears one of which meshes with a gear on the flywheel. The size of the flywheel makes it possible to get a large reduction very conveniently and for that reason is very popular with this type of starter. This system is applied in other ways with equal success, as, for example, through a worm and gear attached to the transmission gearcase.

2—From any electrical supply store you can buy an outfit for charging your battery. It consists of a plug to insert in your line, the battery terminals and a resistance in series to bring down the voltage to the correct charging pressure.

Why Power Increases with Muffler

Editor THE AUTOMOBILE:—Please refer to article published in the June 12 issue of THE AUTOMOBILE on the subject of "Effect of the Cut-out on Power." I have noted with much interest the results of the test run by the Packard Motor Car Co. in which they show that when an engine is operating below 700 r.p.m. or about 32 horsepower that the horsepower for muffler is above that when muffler is cut out.

I must confess that I cannot see why this condition should exist, and would appreciate an explanation of same.

Pittsburgh, Pa. K. L. CAMP.

—There have been many theoretical replies to this question and the explanation generally accepted as to why the power should increase with different types of exhaust line is that for some reason the gases are so distributed that a partial vacuum occurs in the exhaust line, thus having the effect of decreasing the resistance to exhaust and adding that much to the mean effective pressure and hence to the power of the motor. The vacuum which occurs in exhaust lines has been the subpect of much investigation and it has generally been ascribed to injector action of the gases. It hardly seems possible that such a thing should exist with a muffler and yet it is the only reasonable explanation.

How Automobile Costs Can Run Up

Editor THE AUTOMOBILE:—The cost of the upkeep of my car is $350 annually without a mile of riding. In October, 1911, a party came here with a seven-passenger, 1907 model 49, chain-drive Columbia car, from Edgemont, S. Dakota. The car was out of repair and I bought it, thinking I might get it repaired so that I could get 1 or 2 hours' use out of it every day during the season, for several years, by spending, at the outside, $200.

A merchant here had a new man go to work for him about that time, and he talked me out of sending it away and getting a skilled man, telling me that the new man was a sure "crackerjack" on automobiles. My young son and myself took off the body and emptied and cleaned most thoroughly the transmission case. Then came the up-to-the minute "crackerjack" and he worked off and on for 2 months, during which time I bought a new timer and complete sets of intake and exhaust valve rods, and a multiple battery set. I wanted an Atwater Kent system put on, as the car had been running on storage battery, which was gone, but I was told it could not be installed on the car I had, and I since have learned from the Atwater people that the system can be installed on a Columbia. After fruitless work, I called in another expert, the garage man who claimed to have put in full time in the E-M-F factory, and could most surely fix anything that looked like an automobile. So the two men worked all of one forenoon on the car, when the first man said I had better let the expert take the car over to the garage, which was done, and after several months at the garage, and the purchase of entire new bearings for camshaft and transmission case, second and third speed gears, new piston rings, one new piston and a new carbureter, and some few other things I have lost track of. I wanted the garage man to take a 30 or 40-mile try-out trip with me, but he was so busy he could not. So out we went 12 miles and back and outside of a few trips of a mile or two it has been in my barn ever since. Several persons have tried to locate the trouble, but without avail.

When the U. S. reorganized and changed to the Maxwell and published a list of their agents, I wrote to the Denver agent but received no reply. When we get the engine started it does not seem to have any power, and at other times when it makes a show of power the water gets so hot that it boils out in no time. Now I am really at a loss to know just what to do, for the car does not show much wear. I feel that I have a good car to answer my purpose, if I could get hold of someone who was on the job.

When the car was taken down at the garage, two pieces of roller (out of a roller bearing) and two pieces of scrap steel, were found in the transmission.

Newcastle, Wyo. W. R. JACKSON.

Please Sign Your Inquiries

The Editor of the Rostrum is in receipt of several letters which offer no clue to the identity of the sender because they are signed Subscriber, Reader, by initials or noms de plume. These letters are held and will be published as soon as the senders identify them.

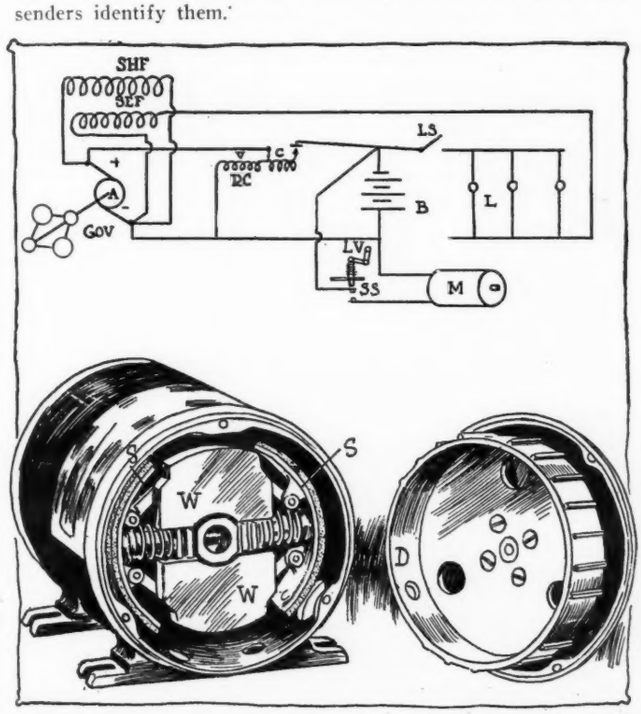


Fig. 3—Gray and Davis wiring diagram and centrifugal governor

Among the New Books

Works on Automobiles, Diesel Motors, Industrial Efficiency, Patent Rights and Electrics Among Offerings

Machine Design and Books on Electricity and Electrical Standards Are Also Fresh from the Press

IN considering the recently-published works which are reviewed herewith perhaps the most interesting feature is the number of books on the subject of the electric automobile and kindred topics. The electric is growing in public favor nowadays and the number of books which are appearing relating to the electric side of automobiling seems to be on the increase. The other books on various subjects mentioned herein are all of the greatest interest as the reader may judge for himself.

THE MAINTENANCE OF MOTOR CARS, by Herrick W. Walford, published by Illiffe & Sons, Ltd., London, 145 5 by 7-inch pages, with 54 figures in the text. Cloth, 2 shillings and 6 pence.

An announcement in the preface of this book states that it is intended to instruct the inexperienced how to look after and keep in good order their motor vehicles. As this would imply, it is a work for novices and those not familiar with the car. In this connection it might be stated that this would be a good book for a new owner to read in broadening his knowledge of the car which he is to drive. The illustrations and text explanations are clear and readily understood, although elementary.

ELEMENTS OF MACHINE DESIGN, PART II, by W. Cawthorne Unwin, F.R.S., LL.D., and A. L. Mellanby, D. Sc., published by Longmans, Green & Co., New York, 426 5 by 8.5-inch pages, with 311 figures in the text. Cloth, $2.50.

In Part I the authors have taken up the general principles of mechanical movements, strength of materials, fastenings, shafting, couplings, power transmission, etc., and in this work it proceeds with this subject in taking up other constructions and movements. The subjects dealt with specifically in this volume are pipes and cylinders, engine design and balancing, cranks, levers and eccentrics, pistons and piston rods, connecting rods, stuffing boxes, flywheels, governors, valves, valve diagrams, and valve movements. As may be seen from the above outline of subjects this book could well be called a text-book on steam engine design, as the subjects dealt with are all in direct connection to this main idea. As such a work it is valuable to the student and for drafting room reference.

DIESEL ENGINES FOR LAND AND MARINE WORK, by A. P. Chalkley, with an introductory chapter by Dr. Rudolph Diesel, published by D. Van Nostrand Co., New York, 226 5 by 8-inch pages, with numerous explanatory charts and engravings. Cloth, $3.00.

With the high cost of fuel, becoming even more keenly felt the tendency toward a heavier product of crude is becoming marked. The success of the Diesel engine in large units has been so marked that there has been considerable talk and effort in the direction of adapting these heavy fuel engines to automobile and other light power plant use. This work on the Diesel is particularly timely in that respect and although not going into the subject of light units very deeply, gives a sufficiently clear explanation of the Diesel cycle and construction of motors actually in use.

PSYCHOLOGY AND INDUSTRIAL EFFICIENCY, by Hugo Münsterberg, published by Houghton Mifflin Co., Boston and New York, 321 5 by 8-inch pages. Cloth, $1.50.

The author divides his work into three parts and an introduction. Part I deals with the best possible man. Part II the best possible work. Part III the best possible effect. In each of these parts the use of applied psychology is studied. The author's definition of applied psychology is a new science which is intermediate between the modern laboratory psychology and the problems of economics. In speaking of the best possible man the first point which is taken up is the necessity for scientific vocational guidance. The present scheme of education offers no assistance to the younger individual in choosing his vocation, and very often when that individual awakes to find his real strong points he has gone so far on a definite course that it is too late for him to change. In this work the author recommends by proper psychological analysis the aid which is necessary in the proper selection of a vocation. Various concrete examples of the use and adaption of psychology to the increase of industrial efficiency are given throughout the work.

PATENT-RIGHTS, THEIR ACQUISITION AND MAINTENANCE, by George G. M. Hardingham, published by Crosby Lockwood & Son, London, 68 5 by 8-inch pages. Boards, 2 shillings.

With the present patent agitation in this country as exemplified in the introduction of the Oldfield bill and the Sanatogen decision, inventors are interested in the various phases of patent legislation. This book shows how the problem is solved in a country which is said to have the best laws covering patent rights.

ESSENTIALS OF ELECTRICITY, by W. H. Timbie, head of Department of Applied Science, Wentworth Institute, Boston, Mass., published by John Wiley & Sons, New York, 271 7 by 4-inch pages, with 222 figures. Cloth, $1.50.

This is essentially a text book of electricity and has been made up by the author from notes taken in the classroom. It has been designed so that it can be used either by an instructor or for self-instruction. It carries the student through the elements of the subject and also gives the principles of many of the simpler appliances which depend upon electrical energy.

PASTIME JOURNEYS FOR ELECTRIC AUTOMOBILES, published in pamphlet form by F. D. Stidham for the Electric Motor Car Club of Boston. Paper, 25 cents.

In this pamphlet there are 20 pages devoted to tours and 5 pages devoted to a list of charging stations. Boston is a center for electric cars and many tours are possible on account of the numerous charging stations available. The tours given in this work extend down into Connecticut and up into Maine, as well as through Massachusetts, New Hampshire, Vermont and Rhode Island.

BRITISH ASSOCIATION REPORTS ON ELECTRICAL STANDARDS, edited by F. E. Smith, published by Cambridge University Press, London, 783 5 by 8.5-inch pages, with numerous figures and diagrams in the text. Cloth, $4.

This represents the work of 41 years of the electrical standard committee of Great Britain. The committee was founded in 1861 at the suggestion of Lord Kelvin and had for its object to determine what would be first the most convenient unit of resistance, and second, the best method for representing that unit. Thirty-nine reports have been submitted by the committee since its existence, the years of 1866 and 1880 being the only two missing from the straight record of annual meetings. The data collected in this work are what might be expected from such a long series of investigations by experts in this work. Some valuable reports are incorporated on the conductivies, resistances and measurements on electric properties of various metals, etc.

ELECTRICITY FOR EVERYBODY, by R. Borlase Matthews, M.I.E.E., published by the Electrical Press, Ltd., London, 300 4 by 7-inch pages, with charts and appended illustrations. Boards, 2 shillings.

If you do not realize what electricity can do in the way of operating various accessories around a house, a study of this handbook will be a great enlightenment. It is more adapted for many utensils than other mediums. There is a short article within the work on selling electric devices which should be of interest to those dealing in this line of goods.

Steering Gear Manufacturer Gives Review of the Development of the Steering Gears Used on Automobiles

LIKE every other mechanical movement applied to the requirements of the automobile industry, the steering wheel, coming from a very simple beginning, had to be developed gradually by profiting from experiences with inadequate, early types, into the efficient class of device found today on the large majority of passenger and commercial automobiles. As is shown in the review of steering gear evolution below, the first class of mechanical steering equipment was designed toward the middle of the last century when large sailing vessels called for more positive and easier control than could be had by means of the old-fashioned tiller. The split-nut type was the first, and from it the gear and sector, gear and worm and what other types are now existent, have been evolved. In the automobile industry it was especially the truck field which presented serious problems, inasmuch as commercial motors, with the development of the industry, were built to carry more and more weight on the front or steering axle, which naturally meant not only the necessity of strengthening the axle, but also the device used for turning it from its straight-advance position and to hold it in any required angular position. This called for very efficient work. How this requirement was met is shown in the following communication:

RACINE, WIS.—Prior to the coming of the automobile there was no vehicle in use that required a steering gear of any refinement or accuracy except the steam traction engine, sailing vessels and steamships. The first, a very slow moving vehicle, was made with a cast worm and sector, winding and unwinding two chains connected to the front axle which moved in both directions being secured at the center by means of a king bolt and a suitable bearing to carry the load. The ratios and pitch of the worm and sector were such as to require six to eight turns of the steering wheel to cramp the axle from side to side, but as the speed was less than five miles per hour the steering gear was not a serious problem.

With the sailing vessel the steering gear was quite a different proposition, particularly when builders constructed sailing vessels of several hundred tons displacement, requiring two and sometimes three men to hold the ship in her course in bad weather, or with the sea running high and a stiff breeze. These conditions brought about a necessity for a steering gear that would minimize labor and make it safe for one man to handle the ship. This was in the early 50s and marked the advent of the mechanical steering gear.

The shipbuilder's problem with the steering gear was in some ways similar to the conditions that have to be met today in automobile designing, and one of the earliest facts the marine engineer recognized was, that besides designing a steering gear that would permit of one man steering a heavy ship without exertion in all kinds of weather, the gear in addition must be so designed that when the hullsman put his wheel up it would stay there without further exertion, and without the necessity of the operator holding it until it was again necessary for him to change the position of the rudder.

Another important detail was to provide a gear that would positively resist the side slap the rudder is subject to in a cross sea. To do this marine engineers brought out a steering gear of the split-nut design consisting of two half nuts, one with a right-hand thread, the other with a left-hand thread. Each of these engaged a worm shaft having both a right-hand and a left-hand thread cut on it, and to this shaft was connected the steering wheel. The gear was irreversible and when left in any position would resist any pressure which the rudder was subjected to.

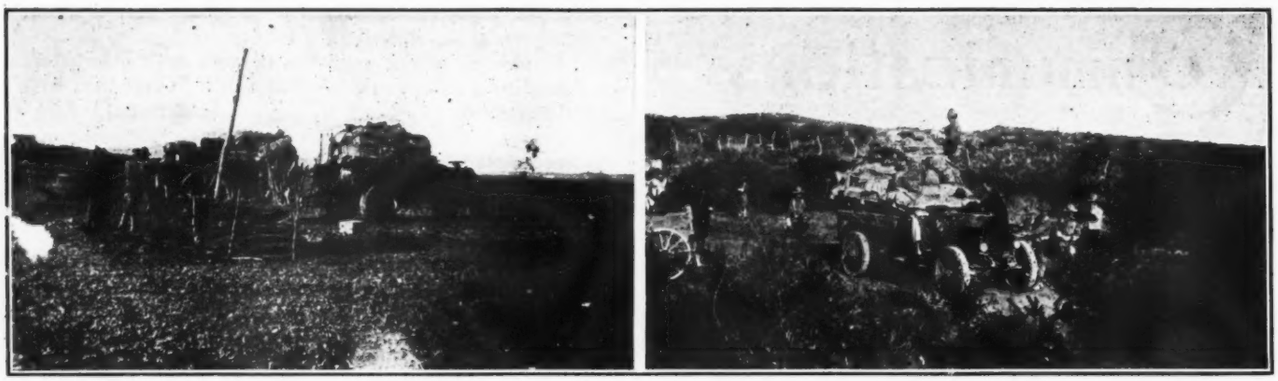
Many other marine steering gears were subsequently designed. Some were composed of a spur gear and pinion, some with a rack and pinion, and some with a single worm working on a sector or spiral wheel. These various styles, while it was possible to get a suitable reduction to get the required leverage to operate the rudder with comparative ease, lacked one essential requirement—namely, irreversibility. It was for this reason that split-nut construction was adopted to the exclusion of nearly every other design for years, or, in fact, until the steamship superseded the sailing vessel and made possible the adoption of the steam and hydraulic steering gear which is power operated. Nearly 65 years have passed since this split-nut steering gear was designed by Jesse Reed. To be exact, the date was June 5, 1894.

Now, compare the requirements of automobile practice with those of the sailing vessel. Some of the first automobiles were made with the steering gear composed of a rack and pinion, and this required the continuous attention of the driver, as the front wheels were free to float in any and all directions on account of the absence of any irreversibility in the gear. This type was used on light automobiles that were not capable of great speed. Next came the worm and wheel, or worm and sector, style, which met with considerable success, and is still used by many builders. This gear could be made at reasonable cost as its manufacture did not require special tool equipment. The tools on which such are made are standard and easily obtainable, a fact which makes the adoption of this design desirable from a commercial viewpoint. From a standpoint of cost to manufacture and efficiency, this gear compared favorably with other chassis parts.

Truck Work More Difficult

With the development of the motor truck came a great many conditions to be met and overcome that did not exist in the passenger car business. First, front axle loads were increased. In five-ton trucks working ten hours a day for six days a week the weak steering gear soon developed. It soon became apparent that the worm and sector type was not desirable for truck work because a large truck, fitted with such a gear and designed to cramp the front wheels 70 degrees in either direction with 1.5 ton to the wheel, did not have surface enough between the worm and sector to give suitable wearing qualities. If the pitch were changed to give more leverage, then it required more turns on the steering wheel to cramp the wheels the desired 70 degrees in both directions. This made the gear too low and dangerous, particularly on fire apparatus where speed and weight are combined and where it is necessary to turn a corner with the least possible movement of the stearing wheel or the same as would be found in the average passenger car.

Summing up: The coming of the motor truck developed an important point in steering gear design, namely, that the ultimate gear must have the greatest possible area between its working parts with the least amount of friction; and, second, that this area must be effected in both directions at the same time in order to minimize the wear and double the leverage. The gear for safety and ease of operation should be irreversible. Without this feature the front wheels will slip and track irregularly, to say nothing of the fact that every obstruction the front wheels come in contact with is telegraphed to the steering wheel and is a source of annoyance and discomfort to the driver and in some cases is dangerous.—C. O. HAMILTON, vice-president, Lavigne Gear Co.



In some places the ground is flat as a floor; in others, as shown at the right, it is hilly

Testing Trucks on the Mexican Border

AUSTIN, TEX., June 27—Remarkable success marks the United States army motor truck service which is in operation in the Rio Grande border territory of Texas. There are three of these trucks, each of 3 tons capacity, and trailers, each carrying 2 tons, regularly employed in transporting commissary supplies to the different isolated camps of the military patrol on duty in the frontier territory. These trucks are of Avery manufacture.

From the standpoint of practicability the service which they are performing is probably putting them to a severer test than they would be subjected to in time of actual warfare. In fact, the conditions under which they are being operated are very similar to those existing when war is in progress. The several regiments of United States troops which are guarding the international boundary line those that separates this country from Mexico are in every respect a picket guard such as might be thrown in front of an army in time of battle array. It is the duty of the commissary department by means of these motor trucks to provide the soldiers daily with food supplies and to transport between the established military posts and the different temporary camps whatever equipment and other articles may be needed from time to time.

One of them is performing in a stretch of territory between Ft. McIntosh and Zapata, 66 miles. The country between these two points is typical of nearly the whole border. It is a succession of rocky hills and deep desert sand. Before the introduction of the motor truck the hauling of goods and supplies between the two places was confined almost exclusively to Mexican ox-carts of the ancient type. These two-wheeled vehicles, drawn usually by four yoke of oxen, were wont to wend their way over the rough road at a rate of about 2 miles per hour. It takes a good 2 days for the ox-carts to make the trip between Zapata and Laredo. The motor truck has cut down this time to about 7 hours when empty and to 10 hours when heavily loaded.

Frequently the trucks have to be pulled through sand

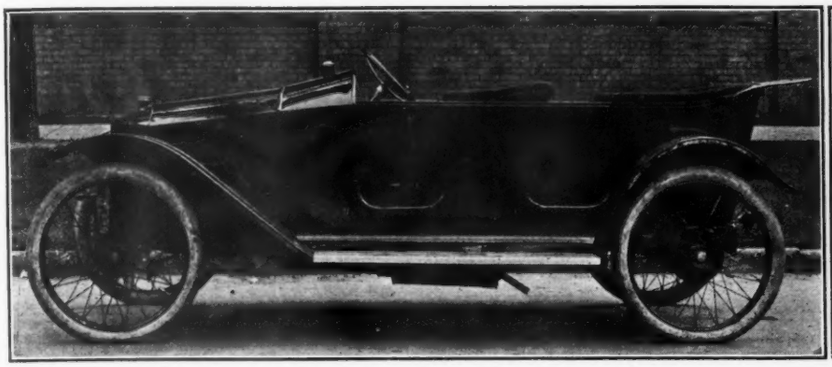
The introduction of the motor truck in the border region has marked the inauguration of a new transportation era for a great scope of ranch territory. The fact that there are a number of communities scattered along the Rio Grande which are situated from 50 to 100 miles from a railroad point makes the employment of the trucks especially valuable to the border military patrol whose camps are scattered all along the river at intervals of almost every 25 miles.

Besides the army motor truck which is in service between Zapata and Ft. McIntosh, the latter post being located at Laredo, there are two other vehicles of the same type in operation along the upper stretches of the international boundary stream.

W. G. Schnelle, manager of the San Antonio branch of the Avery company, of Texas, who drove the truck on its first trip to Zapata from Ft. McIntosh, made the following interesting statement:

"The truck was loaded with 3 tons of commissary supplies and pulled a trailer carrying 2 tons. We crossed arroyos with grades all the way from 17 to 40 per cent. We also traveled through 3 miles of sand that is very difficult to go through with an automobile. The engine on this truck never missed a shot, and there was only 2 quarts of oil placed in the car outside of the full crankcase which we had at the time of leaving Ft. McIntosh. There was not a drop of water placed in the radiator after we started on the trip. On this first journey we were accompanied by Troop L of the Fourteenth United States cavalry, and on this account we traveled by easy stages. We made the return trip with the empty truck and trailer in 6 hours and 50 minutes. I will frankly say that we made pulls with the loaded truck and trailer over some places that should anyone have told us could have been done we would not have believed it. The average time made by a motor truck in the lower border region is 6 miles an hour, which is about three times that made by the old time ox-team that was used until recently for transporting commissary supplies to the camps of the border patrol. The average ox-load was 500 pounds while the carrying capacity of each truck and its trailer is 10,000 pounds."

Nearly the entire border is now covered daily with this army motor truck service. It has been the means of relieving the monotony of patrol duty in those remote isolated stretches of desert and brush-covered wilderness.



Side view of the Carnation, the latest development in the small-car field

Front view, showing tandem arrangement

Carnation Is the Latest in Small Cars

ANOTHER recruit to the small-car class appeared in Detroit during the past week. This newcomer is classed as a cyclecar by some, but in reality it is designed along big-car lines in that it has a gear differential, shaft-driven axle, three-speed gearset, small four-cylinder motor, and other features which link it to its larger brothers, and put it out of the cyclecar contingent at once.

The car is to be known as the Carnation model, and is one of three models to be manufactured on the same type of chassis by the American Voiturette Co., a $500,000 concern, organized about the first of the year with C. B. Shaffer, president of the Keeton Motor Co., at its head and W. G. Houck, also of the Keeton, as vice-president and sales manager.

The body designs are to be two-passenger runabout and four-passenger touring in addition to the unique tandem idea of the first model to appear. The selling prices are fixed at $495 for the tandem here illustrated, $505 for the single-seater, and $510 for the four-passenger type.

The little car is not of standard tread, but is 12 inches less than the conventional 56 inches. The wheelbase is 100 inches for the tandem and gives ample leg-room for both the forward passenger and the one behind. Wire wheels carrying 30x3-inch standard clincher tires are also a part of the makeup.

In general outward appearance the car has much to recommend it, echoing as it does many of the features of foreign small-car design. The streamline effect is pronounced, as will be very apparent from a glance at the front view. The hood slopes down to a V-shaped radiator, meeting the sloping cowl at its rear end.

Since the front seat of this tandem is arranged for one person only, the steering wheel is mounted in the center, while the gearshift lever is placed so as to be readily reached just in front of the seat and also in the middle. A better idea of this may be obtained from the photograph of the front compartment. The control features are standard, there being both clutch and service brake pedals, accelerator and throttle lever on the steering wheel quadrant. In the other two models, where two persons are to sit in the drive seat, the steering wheel is placed on the left.

The motor is of the L-head block-cast type, and is designed for compactness as well as simplicity of manufacture. The crank case is cast all in one piece, there being a removable portion at the bottom which carries the oil reservoir as well as forming an aperture through which the bearings may be inspected. The crankshaft has two main bearings, and the camshaft an equal number.

The bore of the cylinders is 3.375 inches, while the stroke is 3.75 inches, giving a horsepower of 18.25, according to the S. A. E. formula. However, 24 horsepower is claimed on the block at a moderately high rate of speed.

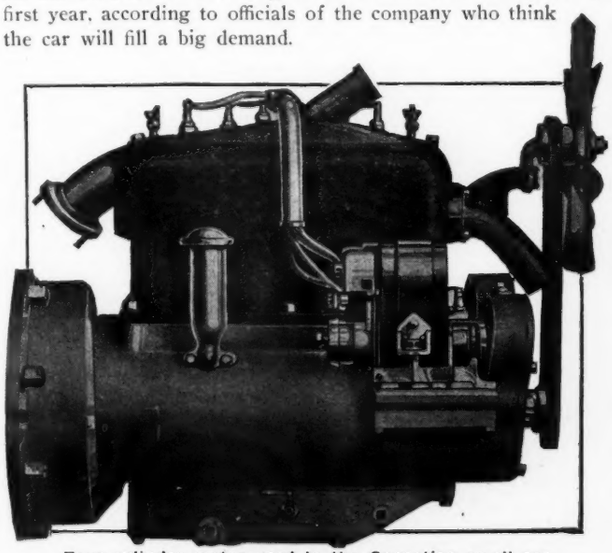
An integral housing at the rear of the crank case incloses the flywheel, while the gear case is bolted to the flange of this housing, making a unit power plant construction, with one motor support at the forward end and two at the rear.

Thermo-syphon cooling is employed, there being a large water outlet header on top of the cylinders. The inlet connection to the casting is located at the forward end. The V-shaped radiator gives ample cooling area. Lubrication is not of the splash type. The designers of the motor deemed it better to make use of a force-feed system in connection with a pump driven from the camshaft. The oil is forced from the reservoir at the bottom to the bearings by oil leads, and also to the timing gears.

The clutch is of the multiple-disk variety, and works in the conventional way. Alternate disks are attached to the engine shaft and to the propeller shaft, and are pressed together to make the driving connection.

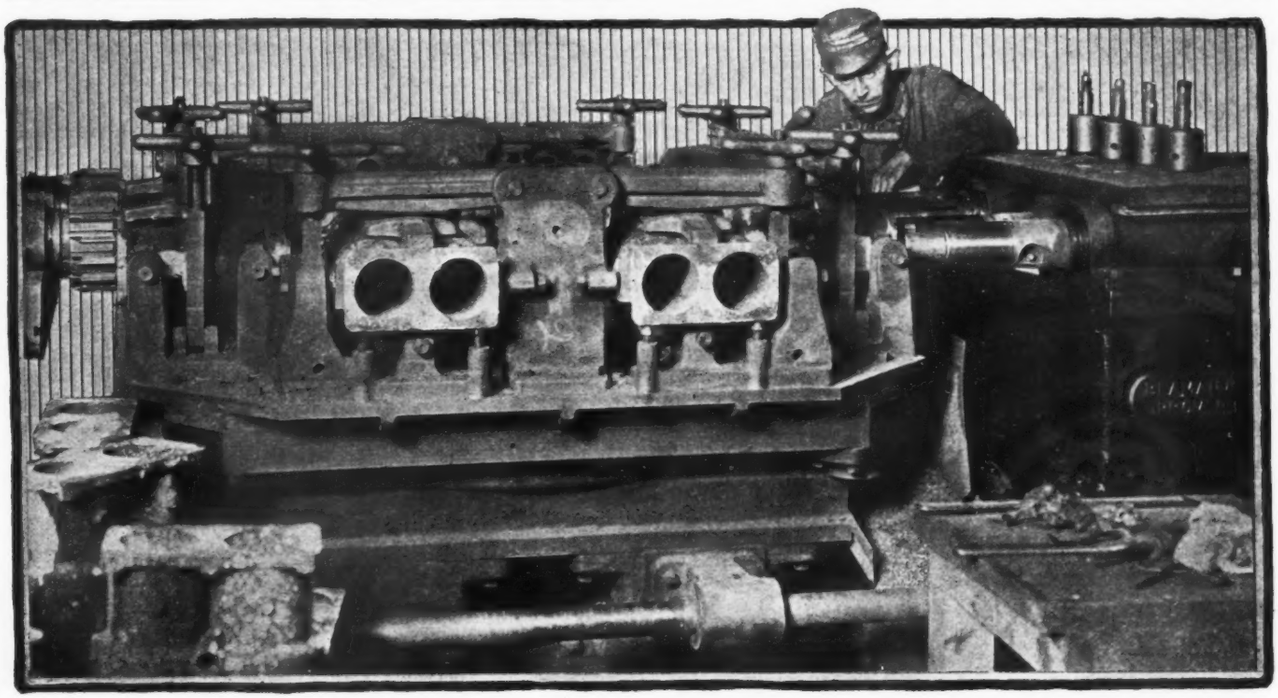
The spring suspension is one of the notable features of the little car. Body and frame are carried on quarter elliptic springs, these being attached to the axles at one end and to the frame at their larger ends, giving a cantilever action.

Present plans of the American Voiturette concern call for the manufacture of about 25,000 of these three models for the first year, according to officials of the company who think the car will fill a big demand.



Four-cylinder motor used in the Carnation small car

Factory Miscellany



Special eight-cylinder boring and milling machine used in the Packard plant for making fifty-eight pairs a day

THIS illustration is of a special four-spindle boring machine used for boring engine cylinders in the works of the Packard Motor Car Co., Detroit, Mich. The spindles are arranged in a row, distanced so as to correspond to the relation of two pairs of cylinders, while the table has a capacity for mounting eight pairs of cylinders on it, two pairs on each of the four sides, and while two cylinders on one side are bored, two on the opposite side of the table are faced by the milling machine attachment there provided. After these operations have been completed, the table is turned 90 degrees, and the next four pairs of cylinders are brought into play, and so on, until all eight pairs have been completed. For all these operations, the machine requires the services of but a few tools. It takes 28 minutes to set up a pair of cylinders, and the machine at the present rate of production turns out fifty-eight pairs of cylinders during 1 day. This speed means that the machine is 75 per cent. faster than the boring machines ordinarily used, so that by supplanting the boring equipment of a factory by this type of machine, the number of machines may be reduced by almost one-half. This, of course, means a saving in floor space proportionate to the magnitude of the factory and its capacity, as well as a reduction in the number of operators. The machine here shown covers a floor space of 150 square feet. The machine is being manufactured by Beaman & Smith, Providence, R. I. This company manufactures a large number of special machines for the automobile industry.

WORLD'S Largest Electric Car Plant—When the Rauch & Lang Carriage Co., Cleveland, O., completes the construction of its new four-story addition to its immense factory, it will then have made a large addition to what is claimed to be the largest plant for the exclusive manufacturing of the electric vehicle not only within the United States but of the world. Ground will be broken immediately for this new building, which will be of brick and concrete. It will be unusually fitted with light facilities and its architectural style will harmonize with the general plan of the large buildings now standing. A sprinkling system, to be installed throughout the entire structure, will be an interesting feature of the new building, which will measure 199 feet by 122 feet, and will mean an additional floor space of 78,000 square feet. Stewart-Warner Addition, The Stewart-Warner Speedometer Corp., has had plans completed for the addition to its plant at Beloit, Wis. The new building will be 120 by 392 feet, and will cost $60,000.

Mayer Carbureter's Detroit Plant—The Mayer Carbureter Co., Buffalo, N. Y., will erect a factory in Detroit, Mich.

To Erect Tulsa Plant—J. B. Levy and associates are preparing to construct a plant at Tulsa, Okla., for building automobiles.

Ex-Cel Truck Company Builds—The Ex-Cel Truck Co., Jamesburgh, N. J., will erect a new five-story factory, 50 by 100 feet, to cost $23,000.

Morrow's Heat Treatment Building—The Morrow Mfg. Co., Elmira, N. Y., has awarded a contract for the erection of a heat treatment building, 100 by 250 feet. This company manufactures automobile parts.

Poyer Purchases Site—D. F. Poyer & Co., Menominee, Mich., manufacturer of automobiles, has purchased a site on which it will erect an addition.

Auburn Contemplating Building—The Auburn Automobile Co., Auburn, Ind., contemplates the erection of a factory. It will be two stories and basement, 60 by 80 feet.

Saurer Buys Land—Additional property has been purchased by the International Motor Co., adjoining its Saurer truck plant in Plainfield, N. J. The land will permit an enlargement of the factory.

Anguish Makes Parts in Detroit—The Anguish Mfg. Co. has been incorporated with a capital stock of $60,000 under Michigan laws, to manufacture parts and accessories, with headquarters at Detroit. It will establish a plant there.

Firestone Capacity Doubled—H. S. Firestone, president of the Firestone Tire & Rubber Co., Akron, O., announces that buildings are under way which will increase the capacity of the plant fully 50 per cent. The power plant is being doubled.

S. & M. Machinery Arrives—The machinery for the new plant of the S. & M. Tire & Rubber Co., Coshocton, O., has arrived and is being installed. It is hoped to be turning out tires by September 15, and it is planned to make about sixty daily at the start.

Ewing Organizes Truck Co.—L. E. Ewing, of Findlay, O., has organized a company in St. Thomas, O., for the manufacture of motor trucks. The company will erect a

plant in the near future. It agrees to employ 300 men at the outset if the city will guarantee its bonds to the extent of $125,000.

Loses Automobile Tire Plant—The Pharis Tire and Rubber Co., Columbus, O., has made an agreement with the Newark, O., board of trade for the installation of a plant in that city that will require immediately $30,000 worth of machinery. Negotiations were on with Columbus and Chillicothe relative to the location of its plant, but failed.

Harvey Forging Company Adds—The Harvey Forging Co., Racine, Wis., and the Harvey Spring Co., manufacturing forgings and springs for automobiles and trucks, is building a large addition to its shops at Racine Junction. It is intended to employ thirty to forty additional skilled mechanics as soon as the addition is ready for operations.

Large Continental Addition—Additions being made to the plant of the Continental Rubber Works, at Erie, Pa., are even more extensive than at first was indicated. The new building that is being put up is to be 226 by 80 feet, four stories high. It will yield 72,320 square feet additional floor space. The company is also erecting two smaller buildings.

Mason's St. Louis Plant—H. L. Mason, inventor of a combination lock for automobiles, has moved to St. Louis, Mo., from Kansas City, Kan., and will install his plant there. The lock looks like the lock on a safe door and works by breaking the contact with a magneto and battery so that the car can be pushed around, but cannot be cranked or otherwise started.

Allen Takes Peabody Plant—E. W. Allen has been elected president and W. O. Allen treasurer and general manager of the Allen Motor Car Co., Fostoria, O. The new company has taken over the assets of the Peabody Buggy Co.'s plant and its selling organization, known as the Columbus Buggy Co., and will call a meeting soon to act upon plans for a new building.

Columbus Buggy Reorganization Possible—The prospects of a complete reorganization of the Columbus Buggy Co., Columbus, O., are growing brighter every day. All of the old management under the Firestones has been eliminated, which resulted in the resignation of E. R. Sharp, one of the creditors' committee. An effort is being made to keep the entire selling force intact, and to that end a force of 200 men is kept employed at the factory.

Stephenson Plant Still Idle.—The plant of the Stephenson Motor Car Co., at South Milwaukee, Wis., which was tied up in the litigation of this company against the J. I. Case T. M. Co., Racine, Wis., is still idle and there is not much likelihood that it will turn a wheel for some time. G. L. Stephenson, president and general manager, has joined the Speedwell Motor Car Co., Dayton, O., as a factory representative in the middle western territory. The Stephenson company lost in its contention for $100,000 damages against the Case company on claims of breach of contract.

Some Ford Figures—Some interesting figures of the enormous amount of material used by the Ford Motor Co., Detroit, Mich., are herewith given; for instance, the National Acme Mfg. Co., Cleveland, O., used twenty-two carloads of steel bars to make the 4,500,000 3-8-inch nuts used on the Ford cars. The holes in these nuts, if placed end to end, would make a little tunnel from the Acme plant in Cleveland to the Ford plant in Detroit, and extend 25 miles up into Michigan. Another example worked out has to do with the copper wire in the magnetos. There are sixteen spools, each wound with 12 feet of copper wire, in each magneto. If the wire used in the 200,000 Fords made this year were straightened out into one wire it would give a strand 38,400,000 feet long. This is equivalent to 7,274 miles, or almost enough to reach through the earth.

Crow Adds 5,000 Square Feet—A new machine shop affording 5,000 square feet additional space has been built adjoining the south side of the Crow Motor Car Co. plant at Elkhart, Ind. The new structure was built to afford plenty of light, and will be utilized as a machine room. The floor is constructed of concrete to give a solid foundation for the heavy milling machines, lathes, drills, etc. A large tract of vacant land east of the plant has been acquired. At present this property is being used for switching purposes, but will accommodate other factory buildings which the present volume of business indicates will be needed soon. Adequate fire protection has also been provided; the factory being equipped with an automatic sprinkling system. The system comprises 10,000 feet of pipe with more than 1,000 release heads. Heavy pressure is furnished at all times as the system is connected with both the city water supply and with a tank of 33,400 gallons capacity. There is at present a day and night shift of workmen employed.

Shows, Conventions, Etc.

October 13.....Philadelphia, Pa., National Fire Prevention Conference, Philadelphia Fire Prevention Commission.
December 9-12.....Philadelphia, Pa., Annual Convention of American Road Builders' Association.

Race Meets, Runs, Hill Climbs, Etc.

July 1-16.....Winnipeg, Man., Motor Plow Competition, Dr. A. W. Bell, Manager.
July 4.....Reliability, New Mexico Automobile Assn.
July 4.....Columbia, S. C., Track Meeting, Columbia Automobile Club.
July 4.....Panama-Pacific Road Race, Western Automobile Assn.
July 4.....Columbus, O., 200-Mile Track Race, Columbus, O., Automobile Club.
July 4.....Washington, D. C., Track Races, National Capital Motorcycle Club.
July 4-5.....Taylor, Tex., Track Meeting, Taylor Automobile Club.
July 4-5.....Sioux City, S. Dak., Track Meetings, Sioux City Automobile Club and Speedway Assn.
July 5-6.....Tacoma, Wash., Road Race, Montemara Festa Automobile Committee.
July 8-16.....Winnipeg, Man., Midsummer Exhibition, A. C. Emmett, Manager.
July 11.....Twin City, Minn., National Reliability Tour, A. A. A.
July 12-13.....Seattle, Wash., Track Races, E. A. Moross.
July 18-19.....Peoria, Ill., Track Meeting, Automobile Club of Peoria.
July 21-25.....Grand Rapids, Mich., Automobile Club Tour.
July 26-31.....San Antonio, Tex., Tour, San Antonio Automobile Club.
July 27.....Grand Rapids, Mich., Tour, Grand Rapids Automobile Club.
July 27-28.....Tacoma, Wash., Tacoma Road Races.
July 28-29-30.....Galveston, Tex., Beach Races, Galveston Automobile Club.
July 29-31.....Lincoln, Neb., Reliability Run, Lincoln Automobile Club.
Aug. 5.....Kansas City, Mo., Sociability and Endurance Run from Kansas City to Colorado Springs, Col., Kansas State Automobile Assn.
Aug. 12.....Kansas City, Mo., Reliability Tour, Kansas State Automobile Assn.
Aug. 18-22.....Milwaukee, Wis., Fourth Annual Wisconsin Reliability Tour, under the auspices of the Wisconsin State Automobile Assn.
Aug. 29-30.....Elgin, Ill., Elgin Road Races, Elgin Road Race Assn.
Aug. 30-Sept. 6.....Chicago, Ill., Reliability Run, Chicago Motor Club.
Sept. 1.....Columbus, O., 200-Mile Track Race, Columbus Automobile Club.
Sept. 9.....Corona, Cal., Track Race, Corona Automobile Assn.
Sept. 12.....Canfield, O., Track Meeting, Canfield Fair Assn.
Sept. 13.....Grand Rapids, Mich., Track Races, Grand Rapids Automobile Club.
Oct. 4-11.....Chicago, Ill., Around Lake Michigan Run, Chicago Motor Co.
Nov. 24.....Savannah, Ga., Vanderbilt Cup Race, Motor Cups Holding Company.
Nov. 27.....Savannah, Ga., Grand Prize Race, Automobile Club of America.

Foreign.

July 12.....Amiens, France, Grand Prix Race.
July 13.....Paris, France, French Grand Prix Cyclecar Race.
July 15-30.....London, Eng., Olympia Heavy Motor Vehicle Show.

Testing room of the Willard Storage Battery Co.'s plant at Cleveland, O.

The Week in the Industry

Engineer — Dealer — Repairman — Garage

CHALMERS SALES CONTEST RESULTS—The winners in the recent sales contest held by the Chalmers Motor Co., Detroit, Mich., have been announced. Since March 1, over 300 Chalmers salesmen have been competing for prizes for the best individual sales records. For each class the prize was the same, $100 in gold or a gold watch. The five winners announced are: Class A, which consisted of the smaller towns, O. L. Blake, Keene, N. H.; Class B, M. W. Carroll, Jr., Waco, Tex.; Class C, W. R. Sweet, Providence, R. I.; Class D, S. E. Murphy, Pittsburgh, Pa.; Class E, H. N. Pyke, New York City.

RUSSELL SALES LARGE—The sales of the Russell Motor Co., Toronto, Ont., from the end of its last fiscal year, were round figures, $2,000,000, being 94 per cent. of sales to the same date last year.

FISHER RESIGNS FROM STUDEBAKER—F. E. Fisher has resigned as manager of the Studebaker Automobile Corp., of Canada, in Walkerville, Ont.

MOTOMETER AGENCY IN DETROIT—E. T. Birdsall, M. E., of Detroit, Mich., has taken the exclusive sale of the Boyce Motometer for the State of Michigan.

REPAIR SHOP OPENED—Heindl-Rothvoss have opened a machine shop at 208-214 West 124th Street, New York City. A full equipment of electrically driven tools, lathes, etc., has been installed, a specialty being made of automobile repair work of all kinds.

TIMES SQUARE'S NEW LEASE—The Times Square Automobile Co., New York City, has leased the store at 1708 Broadway for a term of years.

BERGDOLL BUILDS $65,000 BUILDING—An automobile sales building to cost $65,000 is to be erected at 250 North Broad Street for L. J. Bergdoll. The contract calls for a three-story structure on a lot 75 by 190 feet.

MILLS RESIGNS—H. C. Mills has resigned as special representative of the Automobile Starting, Lighting and Ignition Division of the Westinghouse Electric & Mfg. Co., Pittsburgh, Pa., to become affiliated with the Electric Automobile Co., Toledo, O. Mr. Mills will be manager of the Detroit, Mich., branch.

BUNKER FRISCO OAKLAND MANAGER—Arthur Bunker has been appointed manager of the San Francisco, Cal., branch of the Oakland Motor Car Co., Pontiac, Mich.

FRISCO'S NEW HAYNES STRUCTURE—The San Francisco, Cal., branch of the Haynes Automobile Co., Kokomo, Ind., is now located in a new structure at the corner of Turk and Polk Streets. There are 20,000 square feet of space in the building.

NEW AUTOMOBILE HACK LINE—An automobile hack line has been established between Ironton and Greenup and Russell, O. It is planned to make four round trips between the towns daily.

BERKLY SALES MANAGER—F. J. Berkly has been appointed sales manager of the Bagnell Automobile Co., St. Louis, Mo.

SAN ANGELO FREIGHT SERVICE—Mrs. A. Adrian, Dallas, Tex., has started a passenger and freight service between San Angelo and Sonora. She has placed three freight trucks and one twenty-passenger car in the service. The distance between the two places is 70 miles.

TAXICAB FARES REGULATED—Taxicab fares have been regulated by the City Commission of Montgomery, Ala.

WINDOW DISPLAY CONTEST EXTENDED—On account of delay in delivery of lithographed window display material, the Red Head International Window Display Contest announced by the Emil Grossman Co., New York City, for termination on July 4, 1913, has been extended to October 1.

INTERNATIONAL TOURING REGULATIONS—It is stated at the department of state at Washington, D. C., that the French government, through Ambassador Jules Jusserand, is making arrangements for international automobile regulations, with a view to effecting definite reciprocal touring relations between the United States and France. All operators, owners and chauffeurs desiring to motor in France are obliged to demonstrate their ability to drive a car through the most congested and intricate points in street traffic and in and out of narrow alleys. It is the desire of the French minister of public works to simplify and expedite these formalities as far as possible.

DRAWBACK EXTENDED TO STUDEBAKER—The regulations of the treasury department at Washington, D. C., of June 3, 1913, providing for the payment of drawback on automobiles manufactured by the Briggs-Detroiter Co., Detroit, Mich., with the use of castings made from imported aluminum by the General Aluminum & Brass Castings Co., of that city, have been extended to cover motor cars designated as model 25, manufactured by the Studebaker Corp., of Detroit, with the use of castings made from imported aluminum. The Studebaker Corp. will also be allowed drawback on motor cars known as models 35 and 6 manufactured with the use of imported ball bearings.

NEW STANLEY STEAMERS QUARTERS—Cook & Fletcher, distributors for Stanley steam cars in Baltimore, Md., have opened new quarters at 810 Madison avenue.

LOSEY WESTCOTT SALES MANAGER—R. H. Losey has joined the Westcott Motor Car Co., Richmond, Ind., as sales manager and assistant general manager.

CHICAGO PNEUMATIC TOOL MOVES—The Chicago Pneumatic Tool Co., 716 Arch street, Philadelphia, Pa., manufacturer of the Little Giant truck has removed to 1740 Market street.

PHILADELPHIA'S FIRE EQUIPMENT MOTORIZED—Philadelphia, Pa., will have its fire-fighting service completely motorized in the near future, all horse-drawn equipment to be superseded as rapidly as the new apparatus is installed. A beginning will be made next week, when bids for automobile equipment will be advertised for by Director of Public Safety Porter.

FEWELL, NEW YORK OAKLAND MANAGER—The Oakland Motor Car Co., Pontiac, Mich., announces the appointment of W. B. Fewell as its New York City branch manager. He succeeds Mr. Waite.

TAKES VELVET ABSORBER AGENCY—H. F. Reid, 1514 Hennipin avenue, Minneapolis, Minn., has taken the Northwestern agency for the Blackledge velvet shock absorbing springs.

PORLITZ MINNEAPOLIS LOCOMOBILE MANAGER—A. O. Porlitz, from the Chicago, Ill., branch, has been appointed manager of the Minneapolis, Minn., branch of the Locomobile Co. of America. He succeeds M. P. Leihy, sent to Kansas City., Mo., to open a branch.

FINANCING MANY SALES—The Motor Credit Co., 1587 Broadway, New York City, reports a great many sales which it is financing both on new and used cars in Greater New York and surrounding states. Its policy is liberal, and most any one can own an automobile these days. Whether buying for cash or credit its expert advice is valuable.

PATENTS AUTOMOBILE APPLIANCE—In a patent to Gay Victor De Peel, of Crocker, S. D., there is shown a draft appliance for automobiles in which a windlass detachably secured to the hub of the rear wheel has a rope connected to it and led forward through a friction guide carried on the forward portion of the automobile, with the front end of the rope anchored at a suitable distance in advance of the automobile, so that the engine may operate to wind up on the drum and draw the automobile forward, the machine being suitably guided on the rope by the forward friction guide.

MATHESON WITH PALMER & SINGER—C. W. Matheson, of the now defunct Matheson Motor Car Co., Wilkes-Barre, Pa., has joined the sales organization of the Palmer & Singer Mfg. Co., New York City, which makes Palmer & Singer cars. He will have his headquarters in Chicago, Ill., and will represent the company in the West.

CLOSE OPENS OWN BUSINESS—O. W. Close, formerly the representative of the Maxwell Motor Co. at Minneapolis, Minn., has resigned his position. He expects to go into business on his own account in the Northwestern territory, with headquarters at Minneapolis.

MANY CHICAGO AUTOMOBILES STOLEN—According to the police reports of the Windy City, Chicago, Ill., thieves got away with something like 540 automobiles during the first half of 1913. The cars were valued at $810,000. Out of this total 470 were recovered in one way or another, leaving 70, valued at $110,000, unaccounted for. Only fifteen persons have been arrested in the six months for driving away with cars not belonging to them, the rest of the recovered booty being usually found abandoned in out of the way places or in some garage far from the shores of Lake Michigan.

TICHENOR SALES ENGINEER—Gray & Davis, Inc., Boston, Mass., have appointed C. M. Tichenor sales engineer, covering Detroit, Mich., and adjacent territory, with headquarters in that city.

SACKS WITH GRAY & DAVIS—C. O. Sacks, for many years president of the Rowland Advertising Agency, resigned on July 1 to become advertising manager of Gray & Davis, Inc., Boston, Mass.

ADDING TO GARAGE—The Hoaglin Automobile Co., Oshkosh, Wis., is adding another story to its garage building. The garage is 60 by 150 feet in size, with a 40-foot L, and is already one of the largest in Wisconsin.

INVENTS NEW CARBURETER—L. J. McKone, formerly a well-known automobile dealer at Oshkosh, Wis., and now located at Santa Anna, Cal., has invented a new carbureter designed particularly for Pacific Coast use, which he is demonstrating to several Detroit concerns, including the Ford. This carbureter uses kerosene and other petroleum fuels of lower grade than gasoline. The carbureter is being manufactured by the Duplex Carburetor Co., of Santa Anna.

CAN'T SELL OIL IN IOWA—The Hawkeye Oil Co., Waterloo, Ia., has been granted a permanent injunction restraining the Interstate Oil Co., of LaCrosse, Wis., from selling oil in the state of Iowa so long as F. D. Weatherwax is financially interested in the Interstate company.

PENNSYLVANIA'S GOOD ROAD CONVENTION—A big state convention is being planned for by the Pennsylvania Motor Federation to be held in Harrisburg next September in the interest of good roads.

PULLMAN'S TENTH ANNIVERSARY—Coincident with the fiftieth anniversary celebration of the battle of Gettysburg, at Gettysburg, July 1 to 3, the Pullman Motor Car Co., York, Pa., will celebrate its tenth anniversary.

PRIZES FOR ROAD WORK—The Kenosha Automobile Club, Kenosha, Wis., has set aside a fund of $2,000 to be awarded as prizes for road work during the coming year. Last year $2,000 was set aside for the same purpose, and as a result there was considerably more permanent highway improvement accomplished than might otherwise have been the case.

SHEBOYGAN DEALERS ENTERTAIN—Sheboygan, Wis., dealers last week entertained all dealers within a radius of 50 miles at a banquet and proposed the organization of a district trade association to improve selling conditions and figure out a solution of the used car problem. A question of holding a single motor show as representative of the entire territory did not meet with favor.

ALEXANDER TO CHICAGO FOR SCHEBLER—Klem. Alexander, who for some time has been connected with the Wheeler & Schebler Co., Indianapolis, Ind., has been put in charge of the company's branch in Chicago, Ill. He formerly was in the Indianapolis offices of the company.

RAYFIELD DETROIT BRANCH MOVES—The Detroit, Mich., branch of Findeisen & Kropf, manufacturers of the Rayfield carbureter, has been moved to the large store at 1211 Woodward avenue.

EDWARDS RESIGNS—F. E. Edwards has resigned as chairman of the technical board of the American Automobile Assn., in which capacity he has served since February, 1911. He is to become the Chicago, Ill., agent for Edwards-Knight cars.

STEBBINS ASSISTANT TO REDDEN—C. E. Stebbins, who has been in charge of the Kansas City, Mo., district of the Maxwell Motor Co.'s selling organization, has been appointed assistant to Charles F. Redden, general sales manager of the company. He will make his headquarters at the company's home office in Detroit, Mich.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

AUGUSTA, ME.—Motor Tour Co.; capital, $50,000; to deal in automobiles and manage and conduct automobile tours. Incorporators: M. Brainerd, G. K. Bassett.

BEAUMONT, TEX.—Orleans Motor Co.; capital, $7,500; to deal in automobiles. Incorporators: C. L. Smith, J. E. Smith, S. F. McConnico.

BOSTON, MASS.—Bemis Car Truck Co.; capital, $150,000. Incorporators: Wm. M. Simpson, Chas. E. Selover, E. B. Sibbald, C. A. Mattfield, James M. Satterfield.

CINCINNATI, O.—Commercial Motor Car Co.; capital, $50,000; to manufacture and deal in automobiles. Incorporators: W. G. Vosler, H. A. Hoelscher, E. H. Hoelscher, W. E. Hoelscher, George Hoelscher.

CINCINNATI, O.—Motor Sales & Service Co.; capital, $5,000. Incorporator: James B. Minor.

COLUMBUS, O.—Commercial Motor Car Co.; capital, $50,000. Incorporators: B. A. Hoelscher, E. H. Hoelscher, W. G. Hoelscher, Walter G. Vosler, George Schorr.

DETROIT, MICH.—City Auto Sales Co.; capital, $5,000; to deal in automobiles. Incorporators: F. A. Derval, F. H. Wolf.

HOBOKEN, N. J.—Excelsior Auto Garage; capital, $25,000; to deal in automobiles. Incorporators: A. McHahon, C. B. Hermans, J. F. Marion.

INDIANAPOLIS, IND.—Auto Drive & Parts Co.; capital, $100,000; to manufacture motor car drives and differentials. Incorporators: John J. Kennedy, John J. Kelly, L. D. Buenting.

JERSEY CITY, N. J.—Prest-O-Ceal Co.; capital, $100,000; general automobile business. Incorporators: W. B. Shelton, W. R. Hill, W. H. Carey.

NEW YORK CITY—Consolidated Auto Supply Co.; capital, $10,000; to deal in automobiles. Incorporators: Paul Knopf, Carl Knopf, Morton Bishop.

NEW YORK CITY—Dayton Touring Car Co.; capital, $2,000; to do general automobile business. Incorporators: Thomas Luby, Herbert L. Lindsay, Frank Cunningham.

NEW YORK CITY—Findeisen & Kropf Mfg. Co. of New York; capital, $5,000; to manufacture automobiles, aeroplanes, etc. Incorporators: F. Findeisen, O. F. Kropf, Chas. A. Riegelman.

PITTSBURGH, PA.—Leasure Auto Safety Dash Co.; capital, $150,000; to purchase, manufacture, sell and deal in and with automobiles, trucks and motor vehicles of all kinds. Incorporators: M. F. Edmundson, T. M. Gealey, N. J. Norwood.

ST. LOUIS, MO.—Weber Motor Car Co.; capital, $2,000; to deal in automobiles. Incorporators: Edward, Henry and George Weber.

GARAGES AND ACCESSORIES

BROOKLYN, N. Y.—R-M Auto Repair Co.; capital, $15,000; to repair automobiles. Incorporators: R. D. Marx, W. L. Marx.

BUFFALO, N. Y.—American Engine & Electric Co.; capital, $800,000; to manufacture engines operated by electricity. Incorporators: A. S. C. Loepere, J. H. Morey, W. M. Pyle.

EAST DEDHAM, MASS.—East Dedham Garage; capital, $5,000; general garage business. Incorporators: H. H. Bonnemort, C. J. Bonnemort, I. M. Bonnemort.

GALVESTON, TEX.—Gray's Engineering Works; capital, $7,000. Incorporators: Harry Gray, John E. Mitchell, Edward H. Mitchell.

INDIANAPOLIS, IND.—College Avenue Garage; capital, $2,000; general garage business. Incorporators: F. H. Rupert, M. Rupert, H. A. Davis.

LANSING, MICH.—Automatic Lamp Control and Accessory Co.; capital, $10,000; to deal in automobile accessories.

MOUNT VERNON, N. Y.—Pioneer Pneumatic Wheel Co.; capital, $25,000; to manufacture pneumatic wheels for all kinds of vehicles. Incorporators: W. A. Miles, W. J. Collins, Matthew Drummond.

MT. VERNON, N. Y.—Jaeger Rotary Valve Motor Co.; capital, $40,000. Incorporators: Max Jaeger, Jacob Norden, William Cronenberg.

NEWARK, N. J.—Taxi Co.; capital, $50,000; general automobile taxi business. Incorporators: F. M. Luhden, H. W. Knight.

NEW YORK CITY—Anthony Auto Repair Co.; capital, $10,000; general garage business. Incorporators: Julia Audrasitch, F. M. Struckhausen, Henry Struckhausen.

NEW YORK CITY—Club Scrap Rubber & Tire Co.; capital, $2,500. Incorporators: Harry Dolkart, Abraham Kabalkin, William Adinoff.

NEW YORK CITY—Demos Auto Repair & Garage Co.; capital, $3,000. Incorporators: Demos Tsaconas, Gustave A. Gsell, James H. Bradley.

NEW YORK CITY—M. H. Dingee & Co., Inc.; capital, $10,000; to manufacture and deal in lubricating oils. Incorporators: G. A. Squire, S. S. Squire.

NEW YORK CITY—Turin Garage & Supply Co.; capital, $5,000. Incorporators: John F. O'Neil, Frank H. Coyne, Anna Grabsheid.

PHILADELPHIA, PA.—Warner Spring Mfg. Co.; capital, $50,000; to manufacture and deal in automobile springs.

TOLEDO, O.—Bock Bearing Co.; capital, $375,000; to manufacture and deal in bearings, general appliances, equipment and machinery. Incorporators: W. E. Bock, H. L. Bock, J. N. Lane, R. W. Kirkley, F. H. Geer.

TOLEDO, O.—Engel Auto Parts & Motor Mfg. Co.; capital, $75,000; to manufacture automobile accessories. Incorporators: W. P. Engel, F. T. Betts, S. N. Rapp.

WILMINGTON, DEL.—Ten Brook Tyre Co.; Capital, $250,000; to manufacture, sell and deal in automobile tires. Incorporators: S. S. Adams, J. G. Gray, M. B. Fawkins.

YOUNGSTOWN, O.—Royal Taxicab Co.; capital, $25,000; to do general automobile taxicab business. Incorporators: H. A. Husted, T. J. Raftican, C. T. Gaither, I. M. Hartzell, W. H. Beuchner.

CHANGES OF NAME AND CAPITAL

AKRON, O.—Miller Rubber Co.; capital increase from $1,000,000 to $2,000,000.

CARTHAGE, O.—Hess Spring & Axle Co.; capital increased from $100,000 to $350,000.

INDIANAPOLIS, IND.—Nordyke & Marmon Co.; capital increased from $200,000 to $500,000.

SAN FRANCISCO, CAL.—Thomas Flyer Co.; change of name to the Argonaut Motors Co.

New Agencies Established During the Week

PASSENGER VEHICLES

Place	Car	Agent
Altoona, Pa.	Oakland	Mountain City Motor Co.
Amarillo, Tex.	Oakland	F. W. Hays
Anniston, Ala.	Oakland	Calhoun Gar. & Machine Co.
Atlantic City, N. J.	Oakland	S. T. Zelly
Austin, Tex.	Oakland	F. E. Pryor
Baltimore, Md.	Apperson	Model Auto Co.
Baltimore, Md.	Premier	Walter Scott
Bellingham, Wash.	Oakland	O. Hansen
Birmingham, Ala.	Haynes	Robinson Tire & Auto Co.
Bluefield, W. Va.	Speedwell	G. M. Barger
Boston, Mass.	Lozier	A. W. Woodruff, Inc.
Bowling Green, Ky.	Oakland	G. R. Lewis
Burlington, N. J.	Oakland	Burlington Co. Auto Sales Co.
Caney, Kan.	Oakland	Auto Sales Co.
Chicago, Ill.	Flat	E. E. Hewlett
Chicago, Ill.	R-C-H	Centaur Motor Co.
Columbus, Ga.	Oakland	John Dozier Pou
Crystal Lake, Ill.	Oakland	Chas. Vreeland
Cullioka, Tenn.	Oakland	J. G. Hickman
Darlington, Ind.	Oakland	Oakland Sales Co.
De Kalb, Ill.	Oakland	J. F. Quinn
Englewood, N. J.	Oakland	G. E. Gregory & Son
Fall River, Mass.	Franklin	Place Garage Co.
Fort Wayne, Ind.	Oakland	Fox-Shryock Auto Co.
Foley, Minn.	Oakland	A. V. Stimler
Golden, Ill.	Henderson	J. W. Gronewold
Gonzales, Tex.	Oakland	P. G. Muenzler
Grenada, Miss.	Oakland	Whitfield King
Helena, Mont.	Speedwell	W. A. Baker
Irving, Ill.	Oakland	P. E. Corriker
Jacksonville, Ill.	Speedwell	R. T. Cassell
Joliet, Ill.	Henderson	Crossen & Searer
Kansas City, Mo.	R-C-H	A. Garnier
Kewanee, Ill.	Speedwell	C. M. Forsland
Kittanning, Pa.	Oakland	Fisher & Lambing
Knoxville, Tenn.	Oakland	Ford Sales Co.
Leipsic, O.	Oakland	Dallas Kirk
Little Falls, Minn.	Oakland	E. J. Richie
Los Angeles, Cal.	Westcott	A. C. Lusbey
Louisville, Ky.	Henderson	American Sales Co.
Lowell, Mass.	Maxwell	McKenzie Motor Co.
Memphis, Tenn.	Oakland	City Motor Car Co.
Milwaukee, Wis.	Speedwell	G. L. Stephenson
Montreal, Que.	Franklin	Grothe & Juneau
Montreal, Que.	Oakland	Trudeau & LeFramboise
Montreal, Que.	Winton	W. E. Baker
Nashville, Tenn.	Henderson	Jackson M. C. Co.
New Lathrop, Mich.	Oakland	George Zintel
Newton, Kan.	Oakland	P. A. Martens
Oxford, Ind.	Oakland	Kenyon Auto Co.
Patriot, Ind.	Oakland	Green & North
Petersburg, Mich.	R-C-H	Petersburg Auto Co.
Petersburgh, Va.	Speedwell	W. P. Atkinson Co.
Phillipsburg, N. J.	Oakland	G. W. Kiefer
Port Lavaca, Tex.	Oakland	Fix-It Shop & Garage
Poughkeepsie, N. Y.	Oakland	C. W. Spaulding
Preston, Ia.	Oakland	Preston Auto Sales Co.
Ray, N. D.	Oakland	Western Motor Sales Co.
Red Wing, Minn.	Oakland	Central Garage Co.
Regina, Sask.	Franklin	United Motors Co., Ltd.
Robinson, Ill.	Henderson	Lane Hardware Co.
Rocksford, Ill.	Speedwell	C. W. Nicholas
Rockville, Ind.	Oakland	E. J. Coleman
Salisburg, Mo.	Oakland	F. M. Stamper, Jr.
San Francisco, Cal.	Chandler	S. G. Chapman
San Francisco, Cal.	Hudson	H. O. Harrison Co.
San Francisco, Cal.	Westcott	Dillon-Goodwin Co.
Santa Fee, N. M.	Speedwell	R. Billard
Seattle, Wash.	Herreshoff	A. H. Hertz
Seattle, Wash.	Pope-Hartford	William Eaton
Sheboygan, Wis.	Henderson	T. M. Bowler
St. Louis, Mo.	Interstate	Donovan Auto Co.
Stone Lake, Wis.	Oakland	H. C. Jackson
Tacoma, Wash.	Oakland	R. Ely Breckenbridge
Toledo, O.	R-C-H	E. W. K'Burg
Toronto, Ont.	Henderson	Henderson Motors Co.
Trenton, N. J.	Oakland	J. I. Peoples
Tuscaloosa, Ala.	Oakland	Oak City Garage
Vanhorn, Ia.	Oakland	J. P. McGowan
Waddy, Ky.	Oakland	J. L. Hackworth
Wausau, Wis.	Oakland	Clyde Weik
Wichita, Kan.	R-C-H	G. A. Jones
Westboro, Mo.	Henderson	Dunham & Long
Wilmington, O.	Oakland	Floyd Osborne
Wolcotte, Ind.	Oakland	Chas. Watson
Winchester, Ind.	Oakland	O. E. Davis

COMMERCIAL VEHICLES

Baltimore, Md.	Gramm	Cole Sales Co.
Birmingham, Ala.	Chase	Brown Car Co.
Boston, Mass.	Dart	Dart Motor Co.

ELECTRIC VEHICLES

Tacoma, Wash.	Detroit	Tacoma Elec. Gar. Co.

A V. Shock Absorber—The latest device for producing comfortable riding in the automobile is shown in Fig. 2. This is a French invention just being introduced to the American public by the Hudson Export & Import Co., 140 West Forty-second street, New York City. It operates on a combination of spring and hydrostatic principles.

In the center illustration a general idea of the neat appearance of this new shock absorber may be obtained. It consists of two essential parts, the outer cylinder A permanently attached to the bronze bracket casting C, and an inner sliding cylinder B provided with an aluminum base D from which four long steel bolts extend to the upper bearings E. The bearings C and E fit on the shackle bolts in the ordinary way of most shock absorbers so that the device forms the only connection between the end of the spring and its supporting bracket, or, in the case of the three-quarter elliptic type, between the ends of the two springs.

The section at the left shows clearly the internal construction. The two parts are separated by a pair of springs concentrically arranged, one of which, the outer, is slightly longer than the other. By this arrangement the outer and stronger spring receives all ordinary shocks without the inner one coming into action. On exceptional strain this latter comes into play contributing to the resistance of the main spring.

In addition to the action of the springs and in order to dampen the severe oscillations that are liable to occur immediately after the vehicle passes over a road obstruction the compensating piston and cylinder P are introduced between the two parts of the device. This cylinder is attached to the aluminum baseplate and the piston is a working fit within it. The walls are drilled with a number of holes H for the slow escape of the castor oil with which the cylinder is filled. On the piston descending as the result of a road shock it attempts to displace the oil but as this can only flow through the holes referred to at a certain predetermined rate a slowly yielding cushion effect is produced. On the opposite stroke precisely the same retarding effect is caused through the difficulty experienced by the piston in returning the oil from the outer chamber into the cylinder.

It will be noticed in the outer view that the four corner bolts which connect the lower part of the absorber with the upper bearing bracket also act as guides for the bracket C. The long bearing surface of the guides in this latter part are an excellent feature and contribute materially to the smooth action of the device, besides eliminating all possibility of side sway.

The oil is introduced by removing one of the screws S at the top of the cylinder and squirting in with an oil gun up to the level shown in the section. Castor oil will be found most suitable, the makers advise, although any thin engine oil is quite satisfactory.

A. V. shock absorbers are also made for attachment to the front springs. This type is shown at the right, Fig. 2. In this there are three separate cylinders arranged so that the piston rods of the two smaller cylinders pass at either side of the spring. Connection between the lower ends of the small cylinders J and the main cylinder K is made by holes L of such a diameter that similar retarding effect of oil flow is caused to that produced in the case of the rear spring type.

There is also a large rear type for very heavy vehicles. All three are supplied in a number of sizes to suit various weights and have brackets to suit any width of spring from 1.375 inch to 2.5 inch.

Shimpf Fuel Economizer—As the fuel used in automobiles has become less volatile it has been found that the relation between size of jet and the quantity of gasoline drawn through is such that as a general rule a richer mixture is supplied than is necessary for the higher speeds. In other words, the flow of liquid is too great.

One of the latest devices to reduce this waste of fuel has been designed by Walter H. Shimpf, 1931 Broadway, New York City. This fuel economizer, Fig. 1, consists of an auxiliary air inlet situated between the carbureter and the manifold, in the form of a compound flange A and B, the inner member of which carries a ring R. This ring is designed to revolve by means of a flexible cable and is provided with ports which register with similar ports in the main member A.

By this method the ports register in sequence so that the volume of free air is admitted from all sides and will allow as perfect an adjustment and mixture as can be obtained in the carbureter itself. To insure against leakage, a taper seat valve V controls the admission of the air to the chamber surrounding the revolving ring. The ring is returned to its normal position and the taper seat valve held on its seat through the cable connection leading and attached to the plunger P and spring.

To apply this device, all that is necessary is to loosen the carbureter bolts and insert the device between the carbureter

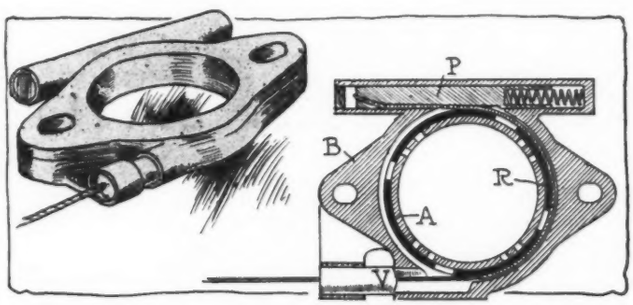


Fig. 1—Shimpf fuel economizer for attachment to manifold flange

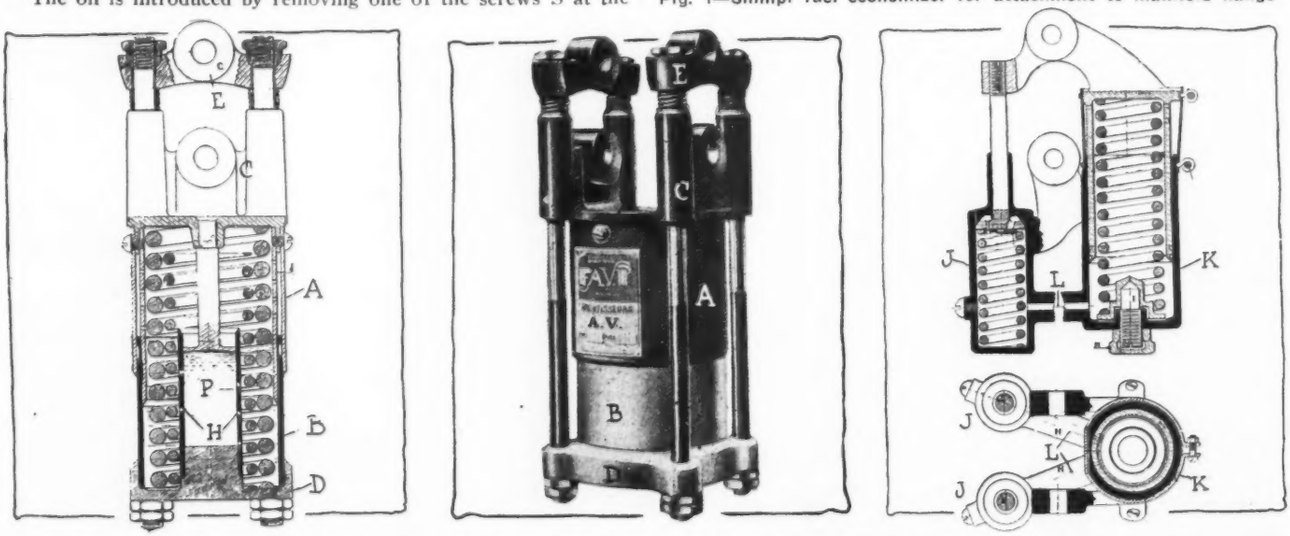


Fig. 2—External and sectional views of the A.V. shock absorber. The section at the right shows the type for front springs

and the manifold. As the device is 7 inches in thickness, however, longer bolts will be required. The carburetor is then put back into position, and the flexible cable attached to the dash or the steering column within easy reach of the operator. This does not require any drilling or tapping of the manifold, and can be readily detached at any time.

Universal Auto-Tire Remover—A tire tool in which are incorporated a number of special features that make it of wide application is shown in Fig. 3. The main parts A and B are used in the ordinary way for the purposes of removing and replacing tires or forcing over the outer ring of a quick detachable rim to expose the inner locking ring. In addition, a number of hooks and links C, D and E, are provided for a variety of uses, such as removing the binding ring and levering open the outer casing to facilitate the removal of the inner tube.

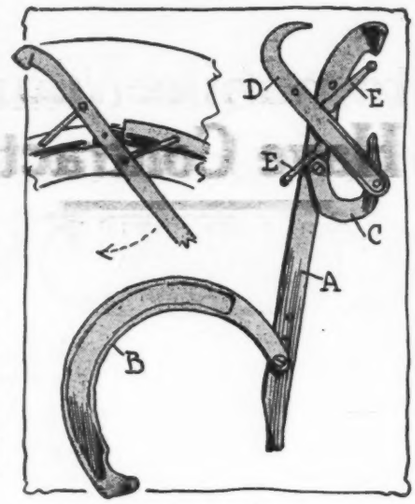


Fig. 3—Universal auto-tire remover

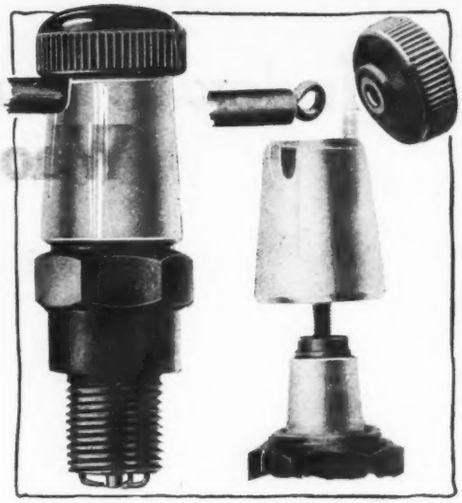


Fig. 4—Watertight Bosch plug

The swivel joint between the parts A and B is adjustable and the main lever is designed with a blunt nose at one end for tire manipulation and a slightly grooved jaw at the other for rim work. To change over from one of these operations to the other it is necessary to take out the swivel screw and change the arched lever B to the opposite end of the main lever. All the smaller hooks and parts are also easily detachable.

When it is desired to open up the outer casing so as to make the inner tube accessible the hook C is inserted at the bead with the blunt end of the straight lever A resting on the outer cover. A stiff casing can then be opened with ease. The hook D is used for removing the locking ring of a quick-detachable rim.

An interesting feature of the device is shown in the small inset, in which the two links E are brought into use for tightening up the binding ring on a Goodrich type Q. D. rim. By moving over the lever to the left the two ends of the binding ring are forced together. The Universal Auto-Tire Remover, 948 Market street, San Francisco.

Watertight Bosch Plug—The latest product of the Bosch Company is the plug, Fig. 4, in which the outer terminal connection is entirely inclosed by a fireproof insulator in such a way that not only are the live parts protected from accidental contact but also from the entry of water. The tapered terminal insulator is made from Steatite, the same material that is used for the plug insulator proper. It is provided with a groove on its upper edge into which the covered wire connection is forced by the insulated terminal nut. The latter is in hard rubber with the brass screwed portion which engages with the terminal stalk embedded in the under surface. An asbestos washer separates the Steatite terminal cover from the body of the plug, a recess in the lower end of the insulator being provided to receive it. The remainder of the plug is constructed according to standard practice of the Bosch Magneto Co.

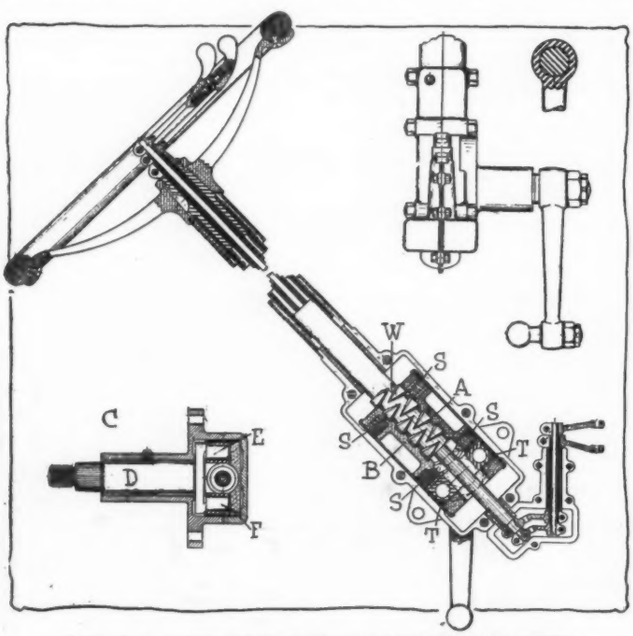


Fig. 5—Lavigne steering gear, showing double worm

Lavigne Steering Gear—This gear acts on the principle of the double-threaded screw and two sliding half-nuts. Fig. 5 is a vertical section in which the worm with its right and left hand thread is shown at W. The pitch is .875 inch and the angle 29 degrees. Engaging with the worm are the two sliding heads or half-nuts A and B. Each of these is provided with two radially drilled holes containing coil springs S which maintain a constant pressure on the half-nuts and take up what little wear occurs. Chrome vanadium steel shoes are placed between the half-nuts and the outer casing to keep these springs in place, and form a guiding surface.

The lower ends of the half-nuts are provided with slots which receive two trunnion blocks T, and these are the means by which the sliding motion of the half-nuts is transformed into the rotary motion of the short horizontal shaft to which the conventional ball arm of the steering gear is attached. The action of the gear will be made clear by reference to the transverse section of the casing at C, which shows the trunnion shaft in its neutral position.

This trunnion shaft D is a T-shaped drop forging of nickel steel, ground finished. The trunnion pins E and F are situated at the ends of the cross piece and bear in the trunnion blocks already referred to, constituting a double-ended lever which is directly operated by the oppositely moving half-nuts when the steering wheel is turned. Since the trunnion shaft is both pushed and pulled at the same time the whole of the area of the screw thread on both sides of the worm is in use, dividing the strain and avoiding play.

The pitch of the gear is such that it is irreversible, at the same time requiring less than one and three-quarter turns of the steering wheel to cramp the front wheels of any vehicle the desired maximum in either direction.

Instead of the usual squared or keyed end connection between the trunnion shaft and the ball arm a corrugated taper joint is used having thirty-six corrugations. With this construction the ball arm is easily removed and adjusted to any desired position in multiples of 10 degrees.

These steering gears are made by the Lavigne Gear Co., Racine, Wis.

Burnham-Stanford Portable Garages—The Burnham-Stanford So., Oakland, Cal., manufactures portable garages, 12 feet 4.62 inches by 15 feet 4.62 inches or by 18 feet 4.62 inches. The houses are made of wood and constructed with one wide door permitting the car to enter and leave. There are two windows. The weights of the two types are 3,850 and 4,400 pounds respectively.

Tinol, the layman's solder, made by Hess & Son, Philadelphia, Pa., is now on the market in the form of sticks of 5 inches length, being suitable for quick repair jobs. If a joint is to be made with the Tinol stick, the parts to be united are scraped, and heated with a match or other flame that is on hand, after which the Tinol is applied. With this solder, no flux is required.